27e Jaargang No 1-4 31 december 1957

FUNGUS

OFFICIEEL ORGAAN VAN DE NEDERLANDSE MYCOLOGISCHE VERENIGING
REDACTEUR: Dr R. A. MAAS GEESTERANUS * RIJKSHERBARIUM * LEIDEN

NOTES ON RESUPINATE HYMENOMYCETES—IV*

M. A. DONK
Rijksherbarium, Leiden

1. Some general remarks are made on structure and development of hymenia; on basidia and cystidia sprouting laterally from repent hyphae; and on place of origin of cystidia.
2. The generic names *Athelia* Pers., *Cristella* Pat., and *Hyphoderma* Wallr. are re-instated for emended genera. The genera *Peniophora* Cooke, *Phlebia* Fr., and *Cristella* Pat. are emended. Two new genera are proposed, *Tylosperma* Donk and *Xenasma* Donk.
3. Of some well known species the synonymy is given, accompanied by short discussions.
4. New specific combinations are made under *Athelia* (10), *Cristella* (13), *Hyphoderma* (24), *Peniophora* (1), *Phlebia* (8), *Tylosperma* (2), and *Xenasma* (6).

INTRODUCTION.—There is a pronounced tendency among mycologists working on the resupinate Hymenomycetes to dump an enormous number of species into a few artificial genera, like *Corticium* Fr., *Peniophora* Cooke, *Sebacina* Tul. The results are more often than not monstrous, non-surveyable agglomerates, which serve no other purpose than to confuse even the specialized mycologist. Often the characters upon which the artificial genera are based are unstable or imaginary too, which tend to emphasize the confusion.

One method of attacking an artificial genus is to segregate a number of smaller genera as soon as they stand out sufficiently and appeal as natural ones and to leave all species not yet classifiable into a residual genus. The trouble is that 'nomenclature' does not favour such a solution, because the Code has no room for it. As soon as the type species of a generic name is thought to belong to a certain natural taxon, that name ceases to be one that can be used for a dust-bin. The one highly unsatisfactory answer I can think of is to use certain generic names—temporarily—in two senses at once, for the natural taxon to which they lawfully belong, as well as for a 'residue'. In practice both will come under one name, the residue being appended to the natural taxon. To distinguish between the correct and incorrect usage of such a generic name I suggest marking the latter category with an asterisk: *Corticium** *confluens* (

* Part I was published *in* Reinwardtia **2**: 425–434. 1954; Part II, *in* Reinwardtia **3**: 363–379. 1956; Part III, *in* Fungus **26**: 3–24. 1956.

NSP ✓
RAM
MM
card ✓
COMMONWEALTH MYCOLOGICAL INSTITUTE
-2 JAN 1958

ex Fr.) Fr. (incorrect use of generic name), *Polyporus brumalis* (Pers.) ex Fr. (correct use).

The crucial point in segregating genera from bigger ones arises in deciding when the chopping off has to be done, and that is purely a matter of individual judgement, like the delimitation of species. If a group appeals to one as a good natural genus one should proceed, and if one has erred the error will be corrected. A procedure that I do not want to defend is breaking up an artificial genus into artificial smaller ones, but the line between the two procedures is often difficult to draw. In any case one should not be too afraid of leaving a residue.

ACKNOWLEDGEMENT.—I am much indebted to Dr R. W. G. Dennis, The Herbarium, Kew, for reading through the manuscript.

1.—Remarks on hymenia, basidia, and cystidia

Before an attempt is made in the present and future "Notes on resupinate Hymenomycetes" to emend some current and forgotten genera and to define some new ones, it will be useful first to discuss some general aspects of such complex structures as hymenia and of their components. I want to emphasize that I have not striven after completeness and that the discussion is fragmentary. A few remarks on sterigmata in general have been made previously (Donk, *1954*).

PLEUROBASIDIA.—At a former occasion I have already briefly mentioned basidia and cystidia with 'bifurcate' or '2—many-rooted' bases in connection with *Ceratobasidium anceps* (Bres. & Syd.) H. S. Jacks. and have called them pleurobasidia (Donk *1956b:* 370). These are not merely basidia laterally more or less sessile on hyphae; they are, rather, lateral extensions of hyphae, broad at their base, and not separated by a cross-wall from the hyphae from which they arise. The latter form the 'bifurcate' bases, which usually appear as two opposed, horizontal 'roots'. Rogers (*1935: 32 f. 16*) first described them in *Peniophora* rimicola* (P. Karst.) Höhn. & L. ("often with bifurcate base") and depicted one pleurobasidium. Next Gregor (*1935: f. 7*) depicted them for *Ceratobasidium anceps* and they were confirmed for this species by Jackson (*1949: 244 f. 1*). Afterwards, in connection with his studies on the *Peniophora* rimicola* group and on *Corticium** sect. *Athele* Bourd. & G., Jackson (*1950a, b*) illustrated pleurobasidia for several more species: *Peniophora* rimicola* (*1950a: f. 1*), *P.* pulverulenta* (Litsch.) H. S. Jacks. (*1950a: f. 3*), *P.* praeterita* H. S. Jacks. (*1950a: f. 4*), *Corticium* inopinatum* H. S. Jacks. (*1950b: f. 1*), *C.* inseperatum* H. S. Jacks. (*1950b: f. 2*), *C.* delicatissimum* H. S. Jacks. (*1950b: f. 7*). It should be remembered that in all these examples the basidia are not invariably lateral extensions; on the contrary, they may quite often be normal, i.e. terminal. Moreover, pleurobasidia occur in species with or without clamps. Recently a new genus was introduced to accomodate a species with typical pleurobasidia, viz. *Pleurobasidium* Arnaud (*1951:* 193), type species, *P. telae* Arnaud (names not validly published).

Pleurobasidia are often typically developed in species in which the fruitbodies consist of nothing but repent hyphae from which the basidia arise perpendicularly: compare the *Peniophora* rimicola* group and *Corticium* tulasnel-*

loideum Höhn. & L. Thus, one may theoretically expect to come across pleurobasidia among the first basidia of, for instance, corticiums with a strong thickening hymenium, that is, among those basidia that are formed directly on a basal layer of hyphae parallel to the substratum. Indeed an example has been depicted by Eriksson (*1950*: *f. 2 f4*) for *Peniophora aurantiaca* (Bres.) Höhn. & L. It would seem, therefore, that as a taxonomic feature pleurobasidia should not be overrated: they may be expected everywhere where basidia are borne on more or less horizontal hyphae, although in certain species the tendency to form them may be strongly pronounced or suppressed. For instance, in *Sebacina* obscura* G. W. Mart. (*1944*: 70 *f. 5;* Tremellaceae) the basidia were described and depicted as "sessile on repent hyphae", but no pleurobasidia were recorded.

The 'bifurcate' base of pleurobasidia reminds one of cystidia that have two or more 'roots'. In the cystidiate species with typical pleurobasidia they are the rule, as appears from Jackson's study on the *Peniophora* rimicola* group. They also occur in taxa in which no pleurobasidia have been found; representative species of such groups are *Peniophora* lauta* H. S. Jacks. and *P.* clematitis* Bourd. & G. Here the cystidia are most often lateral extensions of subicular hyphae.[1] For *Tubulicrinis* Donk (*1956c:* 13) in general no pleurobasidia have been reported and they must, therefore, be rare or absent. Yet, here, too, the cystidia usually arise from more or less repent hyphae and are typically two- or more-rooted. In *Peniophora* Cooke em. (ascending subhymenium) both basidia and cystidia are typically terminal, but I have seen collections of *Peniophora cinerea* (Pers. ex Fr.) Cooke (sensu John Erikss.) in which the cystidia that repose almost directly on the substratum are as typically two-rooted as in any specimen of *Tubulicrinis glebulosus* (Bres.) Donk; the cystidia developing at higher levels in the fruit-body are normal, terminal.

HYMENIAL TYPES.—The hymenium of the Hymenomycetes is best known for the agarics, mainly through Buller's extensive studies (*1922*, *1924*). These investigations have brought to the fore a hymenial type of which one of the notable characteristics is the presence of an outwardly (almost) 'static' subhymenium from which arise all hymenial elements, inclusive of past and future ones.[2] There is a steady replacement of the exhausted hymenial elements by new ones, but the hymenium does not typically increase in thickness; the new basidia, and new sterile cells (if present), are added through a process of intercalation and arise from the same subhymenial layer at about the same height as their predecessors. These hymenial layers are formed at the outside of hymeniophores.

It would seem that intercalation of basidia in not (or not strongly) thickening hymenia may become a morphogenetic force. For instance, *Corticium* bisporum* (J. Schroet.) Höhn. & L. has pellicular fruit-bodies which under optimal conditions become quite perfectly folded like a species of *Merulius* Fr.: however, after drying nothing remains of this configuration and the pellicle will be found to have become smooth. Apparently when the basidia shrink upon drying the

[1] The term 'pleurocystidia' cannot be given to these structures as it has already been applied to cystidia on the face of gills, or similar organs, of Hymenomycetes.

[2] Sterile elements from deeper tissues may penetrate into the subhymenium and the hymenium and may even project beyond the basidia.

total surface of the pellicle rapidly decreases until a smooth and often strongly rimose condition is arrived at.

Among the 'Aphyllophorales' this type is often replaced by a variant in which the new basidia are formed at ever higher levels than the older, maturing and exhausted, ones, so that the hymenium gradually and notably increases in thickness. The branches of the subhymenium that produce these young basidia penetrate between the older basidia. In species with more or less thick-walled spores and thickening hymenia, spores will usually be found included throughout the hymenium. Thus we arrive at two subtypes of euhymenia, the non-thickening and the thickening ones. In euhymenia the basidia and their sterile homologues and derivatives (hymenial cystidia) are the first and principal elements to build up the hymenium. I am fully aware that completely non-thickening hymenia are rare, and that it would be more truthful in most cases to speak of less and more thickening hymenia.

The thickening hymenium was strongly emphasized by Van Overeem (*1923:* 254) as one of the characters of Hymenomycetes with stichic basidia. Donk (*1933:* 66–70) pointed out that such a view could not well be maintained: for instance, in the Coniophoraceae—in which family chiastic basidia had been found in *Serpula lacrymans* (Wulf. ex Fr.) W. B. Cooke—the hymenium thickens considerably.[1] Increasing information in this connection has made it sufficiently clear now that there is no selective correlation between thickening hymenia and stichic basidia. Exceptionally fine drawings of thickening hymenia have been published by Corner (*1950*) for various clavariaceous fungi, for instance for *Clavicorona candelabrum* (Mass.) Corner (*f. 106*), *Clavulina spp.* (*fs. 117, 133, 141*), *Clavulinopsis amoena* (Zoll. & Mor. apud Zoll.) Corner (*f. 148*), *Pterula verticillata* Corner (*f. 238*); and by Eriksson (*1950*) for many species of *Peniophora* sect. *Coloratae* Bourd. & G.

Still other types of hymenia are found among the 'Aphylloporales'. One of these is characterized by those sterile elements that have been called 'paraphyses' (a term to be restricted to the Ascomycetes) and that have recently been renamed 'hyphidia' by Donk (*1956c:* 3).[2] The term hyphidia is restricted to hyphal elements; typical homologues and derivatives of basidia are to be excluded, although intermediates do occur.

The typical hyphidial hymenium comes into being before the first basidia are formed and originally consists entirely of sterile elements, which are either the tramal ground-tissue itself, composed of upright, more or less branched hyphae (*Scytinostroma* Donk); or secondary products, particular to the basidial region (*Laeticorticium* Donk). Enclosed between these sterile elements, or hyphidia, or even below them, the basidia are initiated as offshoots that have to work their way to the surface of the fruit-body in order to be able to pro-

[1] Maire (*1902:* 80) divided the "Autobasidiomycètes Homobasidiés" into "Protohymeniés" (only family, Vuilleminiaceae) and "Euhymeniés" (all other families) and Donk used 'euhymenial' for 'non-thickening', and 'protohymenial' for 'thickening'. I now reject the term 'protohymenial' not only because of its phylogenetic implication, but because it was first given to a different hymenial type: in my opinion *Vuilleminia* Maire has a hyphidial hymenium.

[2] Lowy (*1954:* 302) also felt the need for another term and called them 'dikaryoparaphyses'. This designation is in my opinion not a complete improvement as it still implies that they are paraphyses, which they are not, if that term is to be reserved for the paraphyses of the Ascomycetes.

duce their spores in the air. At first, when the basidia are still few in number, this condition can be easily demonstrated. The number of basidia may increase without obscuring the picture of scattered organs in the basidial region and constituting a diffuse or discontinuous hymenium. However, during periods of intense sporulation, the basidia may become very numerous and the sterile elements relatively scarce, so that a euhymenium is simulated, especially when the sterile elements are not very striking. The basidial region, or hyphidial hymenium, may either be a definite outer layer of the fruit-body (*Laeticorticium*) or it may even coincide more or less completely with the fruit-body itself (*Vuilleminia* Maire). For a drawing of a particular type of hyphidial hymenia (with dichohyphidia), see Corner (*1948: 243 f. 8*).

The distance from the free surface of the fruit-body at which the young basidia originate apparently accounts largely for the characteristic shape of the mature basidia. These often elongate considerably, in order to reach, and project beyond, the surface; not seldom they become flexuose-subnodulose, by working their way between the elements overhead; often they are somewhat swollen at their bases or towards their middles, apparently because the maturing basidia grow by apical prolongation rather than by elongation, the basal swellings reflecting the original shape of the basidium initials (probasidia) which may be distinctly swollen bodies. In euhymenia the young basidia are as a rule narrow (cylindrical, clavate, fusiform) rather than swollen vesicles. However, in thickening euhymenia also, elongation of basidia is inevitably a more or less characteristic phenomenon: compare, for instance, *Clavulina* J. Schroet. ("Clavariaceae"), and certain species of *Coniophora* (DC.) ex Mérat (Coniophoraceae).

When the exserted apex of mature basidia is distinctly swollen and rather wide, this may often be explained by the fact that the basidia are chiastic (as in *Coniophora*) rather than stichic (as in *Clavulina*), to mention a few exemples of genera with thickening euhymenia. Chiastic basidia have been demonstrated for *Vuilleminia comedens* (Nees ex Fr.) Maire among species with hyphidial hymenia.

I am fully aware of the fact that it will be impossible to refer all species of 'Aphyllophorales' to the types of hymenia sketched above: the number of intermediate conditions will appear to be numerous and there will also be some left-overs that are not readily assigned to any of these hymenial types. An example in point is the hymenium found in *Corticium* tulasnelloideum* Höhn. & L. and in the species of the *Peniophora* rimicola* group. In these species the fruit-body consists of repent, narrow hyphae glued together to a thin film in which the individual hyphae can hardly be made out as distinct elements. At the surface of such a film the basidia and (if present) the cystidia protrude as more or less scattered bodies with their basal portions more or less deeply hidden in the hyphal mass. If one is able to isolate complete basidia, they will be found to be pleurobasidia.

Hymenial cystidia.—A better understanding of the thickening hymenium also enables us to distinguish the hymenial cystidia more easily from those that originate elsewhere in the fruit-body and not simultaneously with basidia or their homologues or derivatives (tramal cystidia). Cystidia formed with the basidia (hymenial cystidia) in thickening hymenia become gradually in-

cluded by the continued increase in thickness of the hymenia. They may either collapse and disappear like the exhausted basidia if they are thin-walled (leptocystidia) or they may continue their development, become thick-walled with glassy walls (lamprocystidia) and even encrusted. In the second case the oldest cystidia (originally contemporaneous with the first basidia) are closest to the substratum and mark the original level of the hymenium. The youngest ones (as thin-walled 'cystidioles') are to be found between the basidia that are developing at the hymenial surface. Examples in which the hymenial cystidia may persist as thick-walled, extra-hymenial, lamprocystidia or as gloeocystidia are *Peniophora* roumeguerii* (Bres.) Höhn. & L., *P.* livida* ("Fr.") ex Burt, and all species of *Peniophora* Cooke in a restricted sense (sect. *Coloratae* Bourd. & G.).

2.—Some old genera redefined

This discussion is concerned with the groups of resupinate Hymenomycetes keyed out below. Circumscription and author's names are as given by Bourdot & Galzin (*1928:* 142, 167, 403) and the key itself is extracted from the keys published by these authors.

1. Hymenium smooth, continuous.
   2. Hymenium 'homogeneous': without sterile elements . . . . . *Corticium* Fr.
   2. Hymenium 'heterogeneous'.
      3. Basidia and gloeocystidia . . . . . *Gloeocystidium* P. Karst.
      3. Basidia and cystidia . . . . . *Peniophora* Cooke
1. Hymenium covered with granules, warts, or teeth which are completely fertile, or sterile only at their tips; reposing on a very distinct subiculum.
   4. Teeth blunt, often difformed, irregularly dispersed or confluent. Fruit-body waxy. *Radulum* Fr.
   4. Teeth different.
      5. Hymenium without cystidia or cystidioles. Teeth blunt or pointed, entire. *Grandinia* Fr.
      5. Hymenium with cystidia or cystidioles. Teeth fimbriate or penicillate at their tips. *Odontia* Fr.

These genera, as used by Bourdot & Galzin, are evidenty artificial and the two French authors repeatedly made clear that they were well aware of this fact. Artificial genera may be very convenient, as is the case here. However, this does not imply that the situation should be left permanently unaltered. Taxonomic attempts to improve the situation are long overdue. Unfortunately none of the names used in the above key are to be maintained from a nomenclatural point of view, even if one were disposed to accept the genera unaltered.

Corticium Fr., Fl. scan. 340. 1835. Lectotype, *Thelephora velutina* DC. ex Fr. (cf. Donk *1957:* 25). — This name is untenable because of the earlier homonym *Corticium* S. F. Gray 1821. Moreover, the type possesses cystidia and falls within *Peniophora* sensu Bourd. & G.

Gloeocystidium P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48***:* 429. 1889. Lectotype, *Grandinia exsudans* P. Karst. = *Odontia sudans* (A. & S. ex Fr.) Bres. (cf. Donk *1956a:* 77). — Here again the type species does not belong to the group Bourdot & Galzin called *Gloeocystidium*. The name *Gloeocystidiellum* Donk, originally introduced as a substitute for *Gloeocystidium* sensu Höhn. & L. and as applied by Bourdot & Galzin, is available here. Several recent authors have distributed the species over *Corticium* Fr. and *Peniophora* Cooke, because they thought the genus superfluous.

Peniophora Cooke *in* Grevillea 8: 20. 1879. Lectotype, *Corticium quercinum* (Pers. ex Fr.) Fr. (cf. Donk *1957:* 106). — Untenable if it is a later typonym of *Corticium* S. F. Gray 1821 (non Fr.), which might be the correct name.[1]

Radulum Fr., Syst. Orb. Veg. 81. 1825. Lectotype, *Radulum aterrimum* Fr. = *Eutypa hydnoidea* (Fr.) Höhn. (cf. Donk *1956a:* 109). — Since the type is a pyrenomycete, the name *Radulum* is untenable for a genus of Hymenomycetes, to which the species included by Bourdot & Galzin belong.

Grandinia Fr., Epicr. 527. 1838. Lectotype, *Grandinia granulosa* (Pers. ex Fr.) Fr. sensu Fr. (cf. Donk *1956a:* 77). —Fries's interpretation of the type species has been identified with a species of *Vararia* P. Karst. 1898. Personally I believe this disposition to be incorrect and I consider the species Fries had in mind as unknown. Both opinions lead to the same result, the name *Grandinia* is not available for the assemblage so called by Bourdot & Galzin.

Odontia Fr., Fl. scan. 340. 1835. Type, *Odontia fimbriata* (Pers. ex Fr.) Fr. (cf. Donk *1956a:* 106). — This species was excluded by Bourdot & Galzin and referred to *Mycoleptodon* Pat. 1897 = *Steccherinum* S. F. Gray 1821. In addition, the name is untenable because it is a later homonym of *Odontia* Pers. ex S. F. Gray.

Proposals to save the names *Corticium* Fr. and *Peniophora* Cooke as nomina conservanda for the groups so called by Bourdot & Galzin were rejected by the "Special Committee for Fungi" (cf. Donk *1957:* 26, 106). For those who (i) would abide by the rejection of the proposals, and (ii) also would retain the genera in Bourdot & Galzin's emendations, the correct names would become, perhaps, the following:

Corticium Fr.	*Athelia* Pers.
Gloeocystidium P. Karst.	*Gloeocystidiellum* Donk
Peniophora Cooke	*Corticium* S. F. Gray? [2]
Odontia Fr.	*Dacryobolus* Fr.
Grandinia Fr.	[no name available]
Radulum Fr.	*Xylodon* S. F. Gray? [3]

An ideal solution would be to have the above six names available without types attached to them: this would provide for as many convenient repositories for not yet properly classified species, from which species were to be removed as soon as they were referable to other genera. The Code does not provide the means to attain this situation. Yet, we can not do without such repositories for the present and a solution should be found in this direction. To reach this goal I suggest not only to reduce the number of artificial groups (repositories) considerably but also to wave aside the Code—temporarily—in respect to the use of the names *Corticium* S. F. Gray, *Corticium* Fr., *Peniophora* Cooke, and *Odontia* S. F. Gray, and *Odontia* Fr.

---

[1] If the type of *Corticium* S. F. Gray is Gray's only species (*Thelephora quercina* Pers.) then this generic name is an earlier one for *Peniophora* Cooke. However, if the name has to be written as *Corticium* Pers. ex S. F. Gray and has to be typified by one of Persoon's original species (*Corticium roseum* Pers.) then it will be an earlier name for *Laeticorticium* Donk. For details see Donk (*1957*: 25, 82). A paper discussing the problem of typification of revalidated names will appear in Taxon. — If *Corticum* S. F. Gray would drop out, there still are earlier metonyms available for *Peniophora*.

[2] See preceding footnote. The next available name is *Hyphoderma* Wallr. (1833).

[3] Name of which the type species might well be considered as insufficiently known. For *Odontia* [Pers. ex] S. F. Gray see farther on.

The number of artificial genera might be reduced to no more than two: one, *Corticium* Fr. (non S. F. Gray), for the species with smooth hymenium, and one, *Odontia* Fr., for the species with toothed hymenium. Thus the as yet unclassified species that are referrable to *Corticium* Fr., *Gloeocystidium*, and *Peniophora* of Bourdot & Galzin's scheme of classification go into the first; and those referable to *Radulum*, *Grandinia*, and *Odontia* Fr., into the second.

The application of the name *Odontia* Pers. as published by S. F. Gray depends on the type species that is tagged to it. Donk (*1956a:* 105) chose *Hydnum obtusum* Schrad., but if in the future it be the custom, as I hope it will, that revalidated names should as much as possible be typified in agreement with the first ("original") publication of the devalidated name, it is quite likely that '*Odontia* Pers. ex S. F. Gray' will be typified by *Odontia ferruginea* Pers. = *Caldesiella ferruginosa* (Fr.) Sacc. The identity of *Hydnum obtusum* is doubtful because of the quite insufficient original description, but Fries listed it as a synonym of *Radulum quercinum* (Pers. ex Fr.) Fr. sensu Fr. If *Hydnum obtusum* is accepted as the type species, and if Fries's disposition of it is considered to be in order too, then *Odontia* would be the correct name of a rather extensive taxon, the species of which are now scattered over several genera, although a good number of them one will find concentrated in *Odontia* Fr. sensu Bourd. & G. Perhaps, it would be convenient to have the name *Odontia* conserved with a substitute type like *Odontia arguta* (Fr.) P. Karst.

Authors who want to maintain the taxon called *Radulum* Fr. by Bourdot & Galzin (*1928:* 403) but reject the name because they consider it based on a pyrenomycete, should take the name *Xylodon* (Pers.) ex S. F. Gray into consideration, for it is to be typified by a species, *Sistotrema quercinum* (Pers.) Pers., that might well be *Radulum molare* (Chaill.) ex Fr. (cf. Donk *1956a:* 113–115). Alternatively the type species of *Xylodon* might be taken as not definitely identifiable and, hence, the name *Xylodon* used as a label for a very handy receptacle of not yet properly classified resupinate hydnoids. This latter course should be adopted in case both *Odontia* S. F. Gray and *Odontia* Fr. are not maintained. *Odontia* [Pers. ex] S. F. Gray and *Xylodon* (Pers.) ex S. F. Gray were published simultaneously.

The next move is to pay attention to a few available generic names that have dropped out of current use and will have to be restored as soon as their types are taken out from the repository here called '*Corticium*'. I think it is about time to re-instate *Athelia* Pers. 1822 and *Hyphoderma* Wallr. 1833 as genera independant from *Corticium*. *Phlebia* Fr. 1821 I have already previously redefined by extending it over certain species of *Corticium* Fr. and *Merulius* Fr. (Donk, *1931:* 148), but it needs a new emendation to make it still more inclusive. For *Sistotrema* Fr. 1821, see Donk (*1956c:* 4); and for *Peniophora* Cooke and *Cristella* Pat., see below.

PHLEBIA Fr. *emend.*

Phlebia Fr., Syst. mycol. **1**: 426. 1821. — *Phlebia* sect. *Phlebia* (Fr.) Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 149. 1931.

Ricnophora Pers., Mycol. europ. **2**: 7. 1825. — *Phlebia* sect. *Ricnophora* (Pers.) Pat., Essai taxon. Hym. 107. 1900. — Type species (only original species): *Ricnophora carnea* Pers. = *Phlebia radiata* Fr.

Phlebia trib. *Resupinatus* Fr., Elench. **1**: 154. 1828 (nomen nudum). — Type species (selected): same as of *Phlebia* Fr.

Thelephora subtrib. *Ceraceae* Fr., Elench. **1**: 192, 212. 1828. — *Corticium* sect. *Ceracea* (Fr.) Killerm. *in* Nat. PflFam., 2. Ausg., **6**: 137. 1928. — Type species (selected[1]): *Thelephora livida* (Pers.) ex Fr.

Peniophora sect. *Ceraceae* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 400. [1913] ("Groupe"); Hym. France 314 [1928]. — Type species (selected): *Peniophora molleriana* (Bres.) ex Sacc. = *P. roumeguerii* (Bres.) Höhn. & L.

Corticium sect. *Ceracea* Bourd. & G., Hym. France 212. [1928]. — Type species (selected): *Corticium lividum* (Pers. ex Fr.) Fr.

Peniophora sect. *Membranacea* Killerm. *in* Nat. PflFam., 2. Aufl., **6**: 138. 1928; not *Peniophora* sect. *Membranacea* Bourd. & G. *in* Bull. Soc. Mycol. France **28**: 395. [1913]. — Type species (selected): *Peniophora gigantea* (Fr. ex Fr.) Mass.

Phlebia sect. *Corticioideae* Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 149. 1931. — Type species (selected): *Phlebia livida* (Pers. ex Fr.) Bres.

Phlebia sect. *Merulioideae* Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 149. 1931. — Type species (selected): *Merulius lividus* Bourd. & G.

Corticium sect. *Microceracea* Boidin *in* Rev. Mycol. **21**: 127. 1956 (without Latin description). — Type species: not indicated.

Fruit-body completely resupinate, thin to rather thick, usually closely adnate (sometimes spontaneously separating upon drying), rarely separable by a loose subiculum, waxy, gelatinous, to mucous, indurating or, if diffluent, shrinking into a varnish-like film upon drying, hyaline to often more or less notably coloured when fresh; surface continuous, smooth or folded (folds persisting or not after drying, radiating, or reticulately connected), sometimes tuberculate, or granular by crystal-conglomerations. Basal layer poorly to rather strongly developed and compact (rarely loosely built). Hymenium notably thickening, producing basidia only, or, in addition, various kinds of cystidia which originate together with the basidia at the surface, become included, and either obliterate or continue their development (in which case the deepest cystidia indicate the original level of the hymenium); the structure of older (deeper) portions indistinct. Cystidia lacking, or, if present, originally more or less projecting, either obliterating (leptocystidia) or becoming thick-walled (lamprocystidia). Basidia rather small, slender-clavate, 2–4-spored; sterigmata relatively short. Spores ovoid, ellipsoid, or subcylindrical (often somewhat curved), adaxially flattened to depressed, with sublateral apiculus, small (3.5–7 μ long), colourless; walls thin, smooth, non-amyloid; white in spore prints.

On dead wood or bark, rarely on (other) vegetable débris.

Type species (selected: cf. Fr., Elench. **1**: 155. 1828).—*Phlebia radiata* Fr.; cf. Donk, *1957:* 108.

Examples.—

1. Hymenium permanently and distinctly folded; folds may be reticulately connected.
   2. Hymenium folded; folds more or less elevated, radiating, may be irregularly interrupted. Cystidia often present as small lepto- or/and lamprocystidia: *Phlebia* Fr. *pr.p.* — *Phlebia radiata* Fr., *P. albida* Post ex Fr., *P. centrifuga* P. Karst., *P. donkii* Bourd. apud Donk, &c.
   2. Hymenium reticulately connected: *Merulius* Fr. *pr.p.* — *Merulius lividus* Bourd. & G., *Merulius phlebioides* Bourd. & G.

---

[1] Of this group (18 original species) Fries remarked: "Species nobiliores sunt *T*[*helephora*] *gigantea, alnea, ochracea, granulosa,* quarum singula uno charactere a subtribus typo deflectit, sed reliquis notis et affinitate hoc loco optime retinentur."—Elench. **1**: 213. 1828. For various reasons *Thelephora livida* (Pers.) ex Fr., *T. confluens* Fr. ex Fr., *T. comedens* Nees ex Fr. (*Vuilleminia* R. Maire), and *T. incarnata* Pers. ex Fr. (*Peniophora* Cooke) would seem most eligible. The first is here selected.

1. Hymenium smooth (or at least not permanently folded) or, rarely, warty (warts fertile all over) or granular by included crystal-conglomerations; if folded, this condition (almost) completely disappearing upon drying.
   4. Cystidia lacking or present as inconspicuous leptocystidia: *Corticium* Fr. *pr.p.* — *Corticium lividum* (Pers. ex Fr.) Fr. = *Phlebia livida* (Pers. ex Fr.) Bres., *Corticium aerugineolivida* Romell ex Lundell, *C. flavocroceum* Bres. apud Bourd. & G., *C. pallidocremeum* Litsch., *Corticium seriale* (Fr.) Fr., &c.
   4. Cystidia (inclusive of "cystidioles" and gloeocystidia) present.
      5. Gloeocystidia lacking: *Corticium* Fr. *pr.p.*
         6. Leptocystidia (thin- to slightly thick-walled) present, considerably projecting and conspicuous. — *Corticium subseriale* Bourd. & G., *C. ochraceofulvum* Bourd. & G., *Peniophora flavoferrugineum* (P. Karst.) Litsch. apud Lundell, *P. phlebioides* H. S. Jacks. & Deard. (intermediate between this and next group), &c.
         6. Lamprocystidia (becoming thick-walled and often also encrusted) present: *Peniophora* Cooke *pr.p.* — *Peniophora livida* ("Fr.") ex Burt, *P. gigantea* (Fr. ex Fr.) Mass., *P. cornea* (Bourd. & G.) John Erikss., *P. roumeguerii* (Bres.) Höhn. & L., &c.
      5. Gloeocystidia present; no other cystidia: *Gloeocystidium* P. Karst. sensu Höhn. & L. *pr.p.*
         7. Gloeocystidia not protruding (or only slightly protruding). — *Gloeocystidium umbratum* (Bourd. & G.) Lundell, *Corticium separatum* H. S. Jacks. & Deard.
         7. Gloeocystidia far protruding beyond the hymenial surface. — *Gloeocystidium triste* Litsch. & Lund. apud Litsch.

Donk (*1931:* 148) has already emended *Phlebia* Fr. by assembling within it (i) the typical species of *Phlebia*, that is, *Phlebia radiata* and a few closely related ones, (ii) group b of *Corticium* sect. *Ceracea* Bourd. & G. (*1928:* 214), and (iii) a few species of *Merulius* Fr. A close relationship between *Corticium lividum* and *Merulius lividus* and *M. phlebioides* was already indicated by Bourdot & Galzin (*1928:* 223, 350). Jackson & Dearden (*1949:* 151) remarked in connection with *Peniophora phlebioides* (which they compared with *Corticium subseriale* and *C. ochraceofulvum*, both leptocystidiate members of 'group b'), that it "seems probable that this group, part of which are now in *Corticium* and part in *Peniophora* will sometime be combined in a separate genus with related forms now in *Phlebia*."

Much the same conclusion has been reached by *Boidin* (*1956:* 127–128):

"Les *Corticium* [sect.] *Ceracea*, les *Phlebia* et *Merulius* affines à ces *Corticium* sont bipolaires (ou parfois homothalles). . . . Nous sommes arrivé, en 1954,[1] après étude morphologique et cytologique des cultures, à rapprocher étroitement les espèces céracées réparties jusqu'ici dans des genres et mêmes des familles différents à cause de leur morphologie externe: *Corticium* sect. *Ceracea* microspores (Corticiés), *Phlebia*, *Merulius tremellosus*, *porinoides* [2] (Méruliés ou mêmes Polypores) et, dans une certaine mesure, *Mycoacia uda* (Hydné).

"Toutes ces espèces ont de petites spores uninuclées donnant, contrairement aux "règles de Yen",[3] des germinations et haplontes très cénocytiques et des diplontes aux hyphes aériennes binuclées et bouclés. . . . Il est remarquable que ces *Corticium*, *Phlebia* et *Merulius*, tout comme *Mycoacia uda* se soient révelés bipolaires."

The present treatment goes one step further than Donk's of 1931 by also including some groups of species with thick-walled cystidia (lamprocystidia) of which *Peniophora livida*, *P. roumeguerii*, and *P. gigantea* are respresentative. Perhaps a few gloeocystidiate species (which I did not study) should be incor-

---

[1] In an as yet unpublished thesis.

[2] *Merulius tremellosus* Schrad. ex Fr. and *M. porinoides* Fr. ex Fr. I would hardly include in *Phlebia* as far as my present knowledge goes.

[3] "Ce sont les conclusions de Yen (1950, p. 121) que nous appelons ainsi (cf. Boidin, 1954)."

porated too. It is now possible to exclude from the group b, already mentioned, a few species that belong in other genera.[1]

As in so many other instances it appears difficult sharply to key out this genus which has already appealed to several authors as a natural taxon. The hymenium (and usually the entire fruit-body) is frankly waxy to gelatinous or even mucous; the basidia are small and slender at their base as well as densely compacted into a continuous hymenium; and the spores are small, more or less elongate, adaxially flattened to depressed, thin-walled, and non-amyloid. To this combination should be added the thickening hymenium and all that it implies. The thickening seems in most species to take place quickly and to a considerable extent. What is often called the subhymenium in descriptions is nothing but the old portions of a hymenium that has progressively and constantly been renewed at the free surface at levels farther off from the substratum, without distinct indications of periodicity. In the deeper portions the basidia and many hyphae are collapsed, and this 'subhymenium' appears very dense and composed of indistinct elements. I may have overrated the importance of the thickening hymenium as a generic character, but as far as my knowledge goes it seems a good feature in the present case.[2]

In some species the lamprocystidia remain smooth-walled. This is the case with *Peniophora* sect. *Tubuliferae* group * of Bourdot & Galzin (*1928:* 283), which I now venture to introduce into *Phlebia*. Its best known species is *Peniophora livida*. In other species the lamprocystidia become more or less coarsely and heavily corrugated or encrusted with age. These species, among which are *Peniophora roumeguerii* and *P. gigantea*, have been classed in *Peniophora* sect. *Ceraceae* Bourd. & G. (*1948:* 314–319).

Some species with gloeocystidia may also belong here. In some of these, the gloeocystidia are said to arise at different levels in the subiculum (older portions of the hymenium?) and to extend to the surface of the hymenium (*Corticium separatum* H. S. Jacks. & Deard., *1949:* 154 *f. 4*). This perhaps points to a continued prolongation of these bodies after they have become included, but perhaps they do arise below the hymenium and penetrate into the hymenium.

Confusion is possible in various directions. *Peniophora* Cooke (restricted sense) is very similar in several respects, especially as to its thickening hymenium and the behaviour of the cystidia, but its spores are reddish in a print, the basidia and spores are on an average larger, and the subiculum, when well developed, often tougher. According to Boidin (*1956:* 128) *Peniophora* species are tetrapolar, instead of bipolar like those of *Phlebia*. For differences with *Xenasma*, see under the latter genus.

The genus is most closely related to *Mycoacia* Donk, which differs in its toothed hymenophore and (as is the rule if a hymenium covers well-developed teeth, gills, and the like) in the much less typically thickening hymenium. The microscopical elements of the hymenium closely agree.

[1] *Corticium* sect. *Ceracea* Bourd. & G., group a, represented by *C. confluens* and related species, is left in *Corticium* Fr. (non S. F. Gray); group c does not belong to *Phlebia* in my opinion.

[2] If *Corticium sublilascens* Litsch. belongs here, as seems likely judging from the description, the thickening of the hymenium must be slight if present at all: the fruit-bodies are stated to be 20–30 μ thick, while the basidia are given as 12–14 μ long.

The following new combinations are proposed:

Phlebia aerugineolivida (Lundell) Donk, *comb. nov.* (basinym, *Corticium aerugineolividum* Romell ex Lundell *in* Lundell & Nannf., Fungi exs. suec. Fasc. 37 38: 19. 1950); **Phlebia flavocrocea** (Bres. apud Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium flavocroceum* Bres. apud Bourd. & G. *in* Bull. Soc. mycol. France **27**: 256. 1911); **Phlebia gigantea** (Fr. ex Fr.) Donk, *comb. nov.* (basinym, *Thelephora gigantea* Fr. *ex* Fr., Syst. mycol. **1**: 448. 1821); **Phlebia ochraceofulva** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium ochraceofulvum* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 257. 1911); **Phebia phlebioides** (H. S. Jacks. & Deard.) Donk, *comb. nov.* (basinym, *Peniophora phlebioides* H. S. Jacks. & Deard. *in* Canad. J. Res. C **27**: 150. 1949); **Phlebia serialis** (Fr.) Donk, *comb. nov.* (basinym, *Thelephora serialis* Fr., Syst. mycol. **1**: 445. 1821); **Phlebia subserialis** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium subseriale* Bourd. & G., Hym. France 219. [1928]); **Phlebia roumeguerii** (Bres.) Donk, *comb. nov.* (basinym, *Corticium roumeguerii* Bres., Fungi trident. **2**: 36. 1892).

ATHELIA Pers. *emend.*

Athelia Pers., Mycol. europ. **1**: 83. 1822.

Corticium sect. *Pellicularia* Bourd. & G., Hym. France 191. [1928]. — Type species (selected): *Corticium pelliculare* P. Karst.

DESCRIPTION.—See Bourdot & Galzin, *1928:* 191 (*Corticium* sect. *Pellicularia*).

TYPE SPECIES (selected).—*Athelia epiphylla* Pers.; cf. Donk, *1957:* 20.

EXAMPLES.—

Corticium auriculariae (Bourd. & G.) Bourd.; **Athelia bispora** (J. Schroet.) Donk, *comb. nov.* [basinym, *Hypochnus bisporus* J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 415. 1888]; *A. epiphylla* Pers., usually called "*Corticium centrifugum* (Lév.) Bres."; **Athelia fuscostrata** (Burt) Donk, *comb. nov.* (basinym, *Corticium fuscostratum* Burt *in* Ann. Missouri bot. Gdn **13**: 299. 1926); **Athelia galzini** (Bourd.) Donk, *comb. nov.* (basinym, *Corticium galzini* Bourd. *in* Rev. sci. Bourbonn. **23**: 11. 1910); **Athelia glaucina** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium glaucinum* Bourd. & G., Hym. France 207. [1928]); *Corticium microsporum* (P. Karst.) ex Bourd. & G.; **Athelia mutabilis** (Bres.) Donk, *comb. nov.* (basinym, *Corticium mutabile* Bres., Fung. trid. **2**: 59. 1898[1]); **Athelia neuhoffii** (Bres.) Donk, *comb. nov.* (basinym, *Corticium neuhoffii* Bres. *apud* Neuhoff *in* Z. Pilzk. **2**: 179. 1923; cf. John Erikss. & Lundell *in* Lundell & Nannf., Fung. exs. suec. Fasc. 43–44: 11 no. 2120. 1953); **Athelia pellicularis** (P. Karst.) Donk, *comb. nov.* (basinym, *Corticium laeve* subsp. *C. pelliculare* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 411. 1889); **Athelia olivaceo-alba** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium olivaceo-album* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 239. 1911); **Athelia tessulata** (Cooke) Donk, *comb. nov.* (basinym, *Corticium tessulatum* Cooke *in* Grevillea **6**: 132. 1878); **Athelia violascens** (Fr. ex Fr.) Donk, *comb. nov.* [basinym, *Thelephora violascens* (Fr.) *ex* Fr., Syst. mycol. **1**: 451. 1821]; *Corticium viride* (Link) Bres. apud Höhn. sensu Bres.

Athelia Pers. is here treated as equivalent to *Corticium* sect. *Pellicularia* Bourd. & G., which is without any doubt too narrow a delimitation. However, the primary aim at the present occasion is to bring Persoon's early name back into circulation. Future studies will alter the circumscription of the genus considerably, as can readily be predicted from the following considerations.

Dried fruit-bodies of *Athelia* (in the above sense) have a smooth surface, but of several species it is known that the hymenium in optimal condition becomes conspicuously and irregularly folded as in *Merulius* Fr.: in fact nothing would hinder an inclusion in that artificial genus did not the dried fruit-bodies acquire a smooth hymenium (*A. bispora*). In certain species the merulioid hymenial configuration may less perfectly disappear (*A. pellicularis*)

[1] Not *Corticium mutabile* P. Karst., Krit. Öfvers. Finl. Basidsv. Tillägg 3: 30. 1898 (= *in* Bidr. Känn. Finl. Nat. Folk **62**: 94. 1903). I do not know which of these two homonyms is the earlier one. Cf. Code 1956: Art. 72.

and "il y a toutefois à peine différence spécifique entre *Corticium pelliculare* et certaines formes de *Merulius porinoides*, à plis peu accentués et de formation tardive."—Bourdot & Galzin (*1928:* 344). It will be a necessary, but perhaps not an easy, task to find the boundary between *Athelia* and *Merulius*.

Another difficulty arises on comparison with *Corticium** sect. *Byssina* Bourd. & G. (*1928:* 199; *Byssocorticium* Bondarz. & Sing. ex Sing. *pr. p.*), but here the narrow hyphae without clamp connections of the latter group will in many instances be of some help. Yet, one should not rely too much on these differences. Rogers & Jackson (*1943:* 288) came to the conclusion that in the *Athelia epiphylla* complex presence or absence of rare clamps on the basal mycelium is a difficult and probably not valid basis of separation of species; in some specimens the first clamp has been demonstrated only after a search of twenty minutes. Certain members of the complex are apparently completely devoid of clamps, for instance *Corticium** *decipiens* Höhn. & L. and *C.** *consimile* Bres. Conceivably *Corticium* sect. *Byssina* might be combined with *Athelia*, but on the other hand it seems to come nearer, perhaps, to *Cristella* Pat. If the characteristic ampullaceous swellings in the hyphae of *Cristella* are overlooked, seperation from both *Athelia* and the *'Byssina'* group may become a delicate question and even Bourdot & Galzin made some slips in this regard.

A third group that will have to be taken into consideration for inculusion in *Athelia* is *Tomentella** subsect. *Festivae* Bourd. & G. (*1928:* 482). Here too clamps are consistently lacking, while they are usually (but not invariably) present in *Athelia*. Specimens referred to *Tomentella** *echinospora* (Ell.) Bourd. & G. by Bourdot & Galzin (*1928:* 484) "ont montré des boucles aux hyphes basilaires et le dernier à spores elliptiques, à peine aspérulés se rapproche, par ses élements, de *Corticium centrifugum* [= *Athelia epiphylla*] et *viride*." *Tomentella** subsect. *Leptotrichae* Bourd. & G. (*1928:* 488), too, seems closely related to *Athelia*.

Finally, it looks as if *Athelia* should not be restricted to species without cystidia (or gloeocystidia). I would not at all be surprised if species like *Peniophora** *mollis* (Fr.) Bourd. & G. are soon transferred to *Athelia*.

HYPHODERMA Wallr. *emend.*

Hyphoderma Wallr., Fl. crypt. Germ. **2**: 576. 1833; not *Hyphoderma* Fr., Summ. Veg. Scand. **2**: 447. 1849 (Moniliaceae, Deuteromycetes).

Kneiffia Fr., Fl. scan. 340. 1835 (nomen nudum); Gen. Hym. 17. 1836; not *Kneiffia* Spach, Hist. Vég. Phan. **4**: 373. 1835 (Oenotheraceae). — *Kneiffiella* Underw. *in* Bull. Torrey bot. Cl. **24**: 205. 1897; not *Kneiffiella* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 371. 1889. — *Kneiffiella* P. Henn. *in* Nat. PflFam. **1** (1**): 139. 1897. — *Neokneiffia* Sacc., Tab. compar. Gen. Fung. 11. 1898; *in* Sacc., Syll. Fung. **14**: 11. 1899. — *Pycnodon* Underw. *in* Bull. Torrey bot. Cl. **24**: 431. 1898. — Type species (only original species): *Thelephora setigera* Fr.

Lyomyces P. Karst. *in* Rev. mycol. **3** (No. 9): 22. 1881 ("*Lyomices*"); not *Lyomyces* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 153. 1882. — Type species (selected): "*L*[*yomyces*] *serus* (Pers.)" sensu P. Karst. = *Peniophora setigera* (Fr.) Höhn. & L.; cf. Donk *1957*: 83.

Peniophora sect. *Gloeocystidiales* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 380. [1913] ("Groupe"); Hym. France 279. [1928]. — Type species (selected): *Peniophora argillacea* (Bres.) Bourd. & G.

Peniophora [subsect.] *Submembranaceae* Bourd. & G., Hym. France 279. [1928]. — Type species (selected): *Peniophora argillacea* (Bres.) Bourd. & G.

Peniophora [subsect.] *Maculiformes* Bourd. & G., Hym. France 281. [1928]. — Type species (selected): *Peniophora orphanella* Bourd. & G.

The average species may be characterized as follows: the hyphae in the tramal layer are mostly interwoven, distinct, thin- to firm-walled and not readily collapsing, with conspicuous clamp-connections; the spores are usually cylindrical to oblong and flattened to somewhat depressed on one side (tending to be sausage-shaped), medium-sized to rather long (on an average usually about 8–16 μ long), thin-walled, smooth, colourless, and non-amyloid. Gloeocystidia or firm-walled (but not very thick-walled, heavily encrusted) cystidia, which may occur both and then usually with intermediate stages, are present except in a few species. Fruit-body strictly resupinate; hymenium rather compact, somewhat fleshy when fresh rather than waxy, usually 'smooth', or toothed or raduloid in a few species.

TYPE SPECIES (selected).—*Hyphoderma spiculosum* Wallr. = *Peniophora setigera* (Fr.) HÖHN. & L.; cf. Donk (*1957:* 75).

Hyphoderma in the present emendation is rather a big genus. It shares hyphal characters with several genera of which some have no yet been properly named or emended; this necessitates postponement of a detailed discussion on relationships. However, the sporal characters as indicated above are on a whole distinctive enough. One of the genera that might appear related but differs in its spores is *Tylosperma* Donk (p. 28).

As there is considerable variation in the presence and absence of cystidia and gloeocystidia and in the configuration of the hymenial surface, it is understandable that the contents of the genus has been derived from several of the present-day genera: *Corticium* Fr., *Gloeocystidium* P. Karst. sensu Höhn. & L., *Peniophora* Cooke, *Odontia* Fr., and *Radulum* Fr.

Although accepting these traditional genera, Bourdot repeatedly pointed out close relationships between many of the species now referred to *Hyphoderma* (Bourdot & Galzin, *1911:* 237; *1913:* 381, 399, 400; *1928*). He, even, once clearly outlined the latter genus.

"*P*[*eniophora*] *setigera* est le type d'un groupe dont les formes sont reliées les unes aux autres par des intermédiaires plus ou moins fréquent. De ces formes, les unes paraissent simplement accidentelles, les autres se montrent assez fréquentes avec des caractères plus constantes et sont considérées comme espèces:

1° Sans cystides: *Corticium roseo-cremeum* Bres.; *Odontia transiens* Bres.; *Radulum orbiculare* F.

2° Avec gléocystides, à contenu hyalin: *Cort. roseo-cremeum* Bres.

3° Avec gléocystides, à contenu à la fin résinoïde: *Cort. pallidum* Bres., *Odontia pallida* B. et G.

4° Avec cystides cloisonnées ou non; *Peniophora setigera* D.C. avec variétés odontoïde ou raduloïde; *P. mutata* Peck.

5° Avec cystides modifiées et en faisceaux: *Odontia cristulata* Fr."—Bourdot & L. Maire (*1920:* 74).

Eriksson (*1950:* 6), too, brought several species currently placed in different genera into connection which each other; all are listed below.

A very thorough and critical study on three species was published by McKeen (*1952*). The specific differences between the closely similar *Peniophora heterocystidia* (inclusive of *P. kauffmani* Burt), *P. populnea*, and *P. mutata* [inclusive of *P. allescheri* (Bres.) Sacc. & Syd.] were confirmed by interfertility tests; in cultures all the species formed stalked, capitate conidiophores producing conidia in the upper portion of the apical swelling. Such conidiophores are only rarely found in nature.

The following new combinations are proposed:

Hyphoderma amoenum (Burt) Donk, *comb. nov.* (basinym, *Peniophora amoena* Burt *in* Ann. Missouri bot. Gdn **12**: 276. [1926]; **Hyphoderma argillaceum** (Bres.) Donk, *comb. nov.* (basi-

nym, *Corticium argillaceum* Bres., Fung. trid. **2**: 63. 1898); **Hyphoderma assimile** (H. S. Jacks. & Deard.) Donk, *comb. nov.* (basinym, *Peniophora assimilis* H. S. Jacks. & Deard. *in* Mycologia **43**: 55. 1951); **Hyphoderma clavigerum** (Bres.) Donk, *comb. nov.* (basinym, *Kneiffia clavigera* Bres. *in* Ann. mycol., Berl. **1**: 103. 1903); *Corticium cremeoalbum* Höhn. & L. *in* Wiesner Festschr. 63. 1908; **Hyphoderma cristulatum** (Fr.) Donk, *comb. nov.* (basinym, *Hydnum cristulatum* Fr., Syst. mycol. **1**: 422. 1821); **Hyphoderma definitum** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Corticium definitum* H. S. Jacks. *in* Canad. J. Res. C **26**: 149. 1948); **Hyphoderma fuscum** (Burt) Donk, *comb. nov.* (basinym, *Peniophora fusca* Burt *in* Ann. Missouri bot. Gdn **12**: 244. [1926]); **Hyphoderma gemmeum** (D. P. Rog. apud G. W. Mart.) Donk, *comb. nov.* (basinym, *Peniophora gemmea* D. P. Rog. *apud* G. W. Mart. *in* Lloydia **7**: 73. 1944); **Hyphoderma heterocystidiatum** (Burt) Donk, *comb. nov.* (basinym, *Peniophora heterocystidiata* Burt *in* Ann. Missouri bot. Gdn **12**: 293. [1926]); *Peniophora involuta* H. S. Jacks. & Deard. *in* Mycologia **43**: 54. 1951?; **Hyphoderma macedonicum** (Litsch.) Donk, *comb. nov.* (basinym, *Gloeocystidium macedonicum* Litsch. *in* Bull. Soc. Sci. Skoplje 1939, *n.v.*); **Hyphoderma medioburiense** (Burt) Donk, *comb. nov.* (basinym, *Peniophora medioburiensis* Burt *in* Ann. Missouri bot. Gdn **12**: 328 [1926]); **Hyphoderma montanum** (Burt) Donk, *comb. nov.* (basinym, *Peniophora montana* Burt *in* Ann. Missouri bot. Gdn **12**: 237. [1926]); **Hyphoderma mutatum** (Peck) Donk, *comb. nov.* [basinym, *Corticium mutatum* Peck *in* Rep. New York St. Mus. **43** (St. Bot.): 23. 1890]; **Hyphoderma odontioides** (Burt) Donk, *comb. nov.* (basinym, *Peniophora odontioides* Burt *in* Ann. Missouri bot. Gdn **12**: 223. [1926]); **Hyphoderma orphanellum** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Peniophora orphanella* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 381. [1913]); **Hyphoderma pallidum** (Bres.) Donk, *comb. nov.* (basinym, *Corticium pallidum* Bres., Fung. trid. **2**: 59. 1898); **Hyphoderma polonense** (Bres.) Donk, *comb. nov.* (basinym, *Kneiffia polonensis* Bres. *in* Ann. mycol., Berl. **1**: 103. 1903); **Hyphoderma populneum** (Peck) Donk, *comb. nov.* (basinym, *Stereum populneum* Peck *in* Rep. New York St. Mus. **47**: 144. 1894); **Hyphoderma radula** (Fr. ex Fr.) Donk, *comb. nov.* (basinym, *Hydnum radula* Fr. *ex* Fr., Syst. mycol. **1**: 422. 1821); **Hyphoderma reticulatum** (Wakef.) Donk, *comb. nov.* (basinym, *Peniophora reticulata* Wakef. *in* Trans. Brit. mycol. Soc. **35**: 57. 1952); **Hyphoderma roseocremeum** (Bres.) Donk, *comb. nov.* (basinym, *Corticium roseocremeum* Bres. *in* Ann. mycol., Berl. **3**: 163. 1905); **Hyphoderma setigerum** (Fr.) Donk, *comb. nov.* (basinym, *Thelephora setigera* Fr., Elench. **1**: 208. 1828)[1]; **Hyphoderma subtestaceum** (Litsch.) Donk, *comb. nov.* (basinym, *Peniophora subtestacea* Litsch. *in* Oest. bot. Z. **77**: 132. 1928); **Hyphoderma tenue** (Pat.) Donk, *comb. nov.* (basinym, *Corticium tenue* Pat. *in* Rev. mycol. **7**: 152. 1885).

Peniophora Cooke *emend.*

? *Corticium* S. F. Gray, Nat. Arr. Brit. Pl. **1**: 653. 1821 ("Persoon"), an *Corticium* Pers. *in* Neues Mag. Bot. **1**: 110. 1794 (devalidated name), not *Corticium* Fr., Fl. scan. 340. 1835. — See footnote on page 7.

Thelephora subgen. *Lejostroma* Fr., Syst. mycol. **1**: 452. 1821. — *Thelephora* subtrib. *Lejostroma* (Fr.) Fr., Elench. **1**: 192 ("*Lejostromata*"), 224. 1828. — *Thelephora* sect. *Lejostroma* (Fr.) Duby, Bot. gall. **2**: 767. 1830 ("*Leiostroma*"). — *Corticium* trib. *Lejostroma* (Fr.) Fr., Epicr. 562. 1838. — Type species (selected[2]): *Thelephora maculaeformis* Fr. ex Fr. = *Peniophora polygonia* (Pers. ex Fr.) Bourd. & G., according to John Eriksson (*1950*: 72).

Peniophora Cooke *in* Grevillea **8**: 20. 1879. — *Xerocarpus* [subgen.] *Peniophora* (Cooke) P. Karst. *in* Rev. mycol. **3** (No. 9): 22. 1881. — *Corticium* [sect.] *Peniophora* (Cooke) J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 423. 1888.

[1] *Thelephora granulosa* "Pers." ex Fr. 1821 is here rejected as basinym for the correct name of this species, because I regard it as a nomen ambiguum (Code: Art. 65). *Thelephora setigera*, being published in the starting-point book, takes precedence of *Thelephora aspera* Pers.

[2] Of the original species, three belong to *Peniophora* Cooke as here emended. One of these, the second, *Thelephora cinerea* (Pers.) ex Fr., might seem outstanding enough to be selected as the type, but Fries (*1828*: 221) temporarily removed it from the group when he redefined the latter; "Facile a prioribus [*Thelephora* subtrib. *Ceraceae*] dignocitur habitu substantia subfarinacea, vita perenni" (*l.c.* p. 224). Thus, attention is diverted to *Thelephora acerina* (Pers.) ex Fr., the first of the original species. However, it, too, was afterwards excluded by Fries (*1849*: 333; *1874*: 645) and removed to *Stereum*, where it was included as of doubtful position. *Thelephora maculaeformis*, being a constant member of '*Lejostroma*' is, therefore, on this occasion selected as the type species.

Cryptochaete P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 407. 1889. — *Aleurodiscus* subgen. *Cryptochaete* (P. Karst.) Pilát *in* Ann. mycol., Berl. **24**: 222. 1926. — Type species (selected): *Corticium polygonium* (Pers. ex Fr.) Fr.; cf. Donk (*1957:* 68).

Gloeopeniophora Höhn. & L. *in* S.B. Akad. Wien (M.-n. Kl. I) **116**: 815. 1907. — *Peniophora* subgen. *Gloeopeniophora* (Höhn. & L.) Sacc. *in* Fl. ital. crypt., Fungi, Hym. 1180, 1189. 1916. — Type species (only original species): *Peniophora incarnata* (Pers. ex Fr.) Cooke.

Peniophora sect. *Coloratae* Bourd. & G. *in* Bull. Soc. mycol. France **28**: 402. [1913] ("Groupe"); Hym. France 319. [1928]. — Type species (selected): *Peniophora corticalis* (Bull. ex St.-Amans) Bres. = *Peniophora quercina* (Pers. ex Fr.) Cooke.

Peniophora subgen. *Eupeniophora* Sacc. *in* Fl. ital. crypt., Fungi, Hym. 1179, 1180. 1916 ["(Cooke)"]. — Type species (selected): *Peniophora carnea* (Willd. ex Wallr.) P. Karst. = *Peniophora quercina* (Pers. ex Fr.) Cooke.

Peniophora sect. *Tremelloideae* Killerm. *in* Nat. PflFam., 2. Aufl., **6**: 138. 1928. — Type species (selected): *Peniophora corticalis* (Bull. ex St.-Amans) Bres. = *Peniophora quercina* (Pers. ex Fr.) Cooke.

DESCRIPTION & EXAMPLES.—See Eriksson, *1950:* 9 (*Peniophora* sect. *Coloratae*).

TYPE SPECIES (selected: Clem. & Shear, Gen. Fungi 345. 1931).—*Corticium quercinum* (Pers. ex Fr.) Fr.

The genus as here emended about equals *Peniophora* sect. *Coloratae* Bourd. & G. (*1928:* 319). Now many years ago Donk (*1931:* 172) already concluded that "this very natural group, for the first time sharply delimitated by Bourdot & Galzin, could . . . certainly be accepted as a distinct genus" (translated from the Dutch). Eriksson (*1950*), who carefully studied the European and some North American species from different aspects, is of the same opinion:

"It is evidently rather well distinguished from the other sections of the genus [*Peniophora*] . . . It would . . . be desirable, from a practical point of view, to separate the '*Coloratae*' from the very large genus *Peniophora*. The group occupies approximately the same position within *Peniophora* as does *Lloydella* within *Stereum*. Both groups seem to deserve generic rank."—Eriksson (*1950:* 9).

Shortly afterwards Boidin (*1951: 79*), too, come to the same conclusion: ". . . la section *Coloratae* des *Peniophora*, section qui n'attend qu'un nom générique."

Eriksson's excellent and critical treatment of the Swedish and some extra-Swedish species (*1950*) is easily the best account we have of any group of this size of resupinate Hymenomycetes. His studies combine careful microscopical examination (inclusive of type studies) with a profound knowledge of the species in nature as well as extensive research in the laboratory. By pairing monospore mycelia he has gained the necessary insight into the limits between the sometimes very plastic species. Add to this the fine drawings and one gets a publication of the kind that is far too rare in mycology.

Recently our knowledge of *Peniophora* s. str. has been considerably enriched by the work of Boidin (*1951a, b*) and Tassinari (*1956*), especially with regard to the gloeocystidia (positive reaction with sulpho-aldehydic tests), the cytology of the basidia (hemi-chiastic), and the sexuality (tetrapolar type).

Peniophora Cooke appeals as a natural group and as here emended, is nearly the same taxon as *Peniophora* sect. *Coloratae* Bourd. & G. (*1928:* 319). Yet a few retouches seem appropriate. Eriksson (*1950:* 6) has already excluded *Peniophora* laevigata* (Fr.) P. Karst., which is closely related to *Stereum* chailletii* (Pers. ex Fr.) Fr. These two species, and one or two additional ones, form a well-defined group which does not well fit into *Stereum* Pers. ex S. F. Gray

where it is currently included. In contrast with *Peniophora* this group has amyloid spores (cf. Boidin *1950a:* 462; *1950b:* 135). At least two other species, retained in *Peniophora* by Eriksson, deserve special consideration as possible kernels of small satellite genera.

In the first place I have in mind *Peniophora versiformis* (Berk. & C.) Bourd. & G. This and a few related species from North America differ in possessing a system of coloured (brown) hyphae which branch dendroidly towards the hymenial surface (dendrohyphidia) where they may form a felted layer when the fruit-body is not actually forming basidia profusely. In addition, these species are not (or not all) strictly resupinate and often produce narrowly reflexed upper margins, and the consistency is dryer even in fresh fruit-bodies.

The other aberrant species is *Peniophora polygonia* (Pers. ex Fr.) Bourd. & G. The fruit-body starts as a wart-like body (from which secondarily resupinate portions develop all around), much like that of *Stereum* rufum* (Fr.) Fr.; the basidia are accompanied by hyaline, deliquescent dendrohyphidia and there are no thick-walled cystidia supplementing the gloeocystidia (as in *Peniophora lilacea* Bourd. & G.). *Peniophora polygonia* is the type of the name *Cryptochaete* P. Karst. and Lentz (*1955*: 15 [1]) has placed under this denomination besides *P. polygonia* also *Stereum rufum*, keeping this small genus apart from both *Peniophora* and *Stereum* Fr. Finally, one might consider re-instating *Sterellum* P. Karst., type species, *Stereum* pini* (Schleich. ex Fr.) Fr. and add *S. rufum* as a second member of the genus. *Stereum pini* appears closely related to such species as *Peniophora septentrionalis* Laurila, *P. pithya* (Pers.) J. Erikss. *P. separans* Burt, as has been shown by Nobles (*1956*), but the margin of the fruit-body is free (appressed or slightly reflexed), the gloeocystidia vesicular, and the spore print shows no red colour; it lacks the hyaline dendrophyses of *P. polygonia*.

Another solution would be to emend *Peniophora* in such a manner as to include both *Cryptochaete* and *Sterellum*. This course seems the one followed by Boidin (*1956:* 123) who recently transferred *Stereum pini* to *Peniophora*.

Peniophora laeta (Fr.) Donk, *comb. nov.*

Corticium hydnoideum Pers., Obs. mycol. **1**: 15. 1796 (devalidated name). — *Thelephora hydnoidea* (Pers.) Pers., Syn. Fung. 576. 1801 (devalidated name). — *Thelephora hydnoidea* (Pers.) *ex* Fr., Syst. mycol. **1**: 445. 1821. — *Hydnum thelephoroideum* Duby, Bot. gall. **2**: 774. 1830. — *Thelephora decorticans* var. *hydnoidea* (Pers. ex Fr.) Wallr., Fl. crypt. Germ. **2**: 564. 1833. — *Radulum hydnoideum* (Pers. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 114. 1882. — *Corticium comedens* var. *hydnoideum* (Pers. ex Fr.) Quél., Fl. mycol. France 5. 1888. — *Peniophora incarnata* var. *hydnoidea* (Pers. ex Fr.) Bourd. & G. *in* Bull. Soc. mycol. France **28**: 404. [1913]. — *Peniophora hydnoidea* (Pers. ex Fr.) Donk, Rev. niederl. Homob.-Aphyll. **2**: 70, 263. 1933, not *P. hydnoides* Cooke & Mass. *apud* Cooke *in* Grevillea **16**: 77. 1888.[2]

Sistotrema glossoides Pers., Mycol. europ. **2**: 193. 1825. — *Radulum glossoides* (Pers.) *ex* Fr., Elench. **1**: 153. 1828. — *Hydnum glossoides* (Pers. ex Fr.) Duby, Bot. gall. **2**: 77. 1830. — Type: "*Sistotrema glossoides*" in herb. Persoon (L 910.270–472).

---

[1] Lentz, moreover, took *Stereum rufum* (Fr.) Fr. as the type. See further Donk (*1957:* 68).

[2] This use of the epithet 'hydnoidea' in combination with *Peniophora* expressed Donk's belief that it was not homonymous with the earlier epithet 'hydnoides'. From a strictly grammatical point of view we are dealing here with different words. However, the examples added to Art. 75 of the Code show that such pairs are to be regarded as orthographic variants and must be treated as homonymous.

Radulum laetum Fr., Elench. **1**: 152. 1828. — *Gloeopeniophora laeta* (Fr.) W. Brinkm. *in* Jber. westfäl. Prov.-Ver. Wiss. Kunst 44: 30 *pl. 2 f. 2.* 1916. — Apparently isonyms of *Corticium hydnoideum.*

Gloeopeniophora incarnata f. *odontioidea* W. Brinkm. *in* Bot. Ztg **67** (II): 229. 1909.

DESCRIPTION & ILLUSTRATIONS.—Bourdot & Galzin, *l.c.* (*Peniophora incarnata* var. *hydnoidea*); Brinkmann, *l.c.* (*Gloeopeniophora laeta*).

TYPE (selected).—"*Thelephora hydnoidea*" in herb. Persoon (L. 910.267–393).

This highly characteristic fungus is, without a doubt, closely related to *P. incarnata* (Pers. ex Fr.) P. Karst., but in my opinion deserves specific rank. This is not a novel conclusion; it was already reached by Von Höhnel (*1911*) and Brinkmann (*1916:* 29–30). At first Brinkmann (*1909:* 229) was of a different opinion. It was not mentioned in Eriksson's monograph of the Swedish species of *Peniophora* sect. *Coloratae.*

Brefeld (*1888:* 30) states that "Die Sporen ... keimen oft mit der Bildung von Secundärsporen, wobei nachträglich in der Spore eine Begrenzungswand auftritt ..." This seems not very plausible.

The types of *Corticium hydnoideum* and *Sistotrema glossoides* are to be found in the Rijksherbarium, Leyden, where I studied them. The name *Radulum laetum* might well be regarded as a mere isonym of *Thelephora hydnoidea* (Pers.) ex Fr.

PENIOPHORA LIMITATA (Fr.) Cooke

Thelephora cinerea var. "*Th. interrupta*" Pers., Syn. Fung. 580. 1801 (devalidated name). — *Thelephora cinerea* var. "*T. interrupta*" Pers. *ex* Fr., Syst. mycol. **1**: 453. 1821. — *Thelephora fraxinea* Pers., Mycol. europ. **1**: 145. 1822 (isonym). — *Corticium fraxineum* (Pers.) Roum., Fung. exs. No. 6517. 1894; *in* Rev. mycol **16**: 110. 1894. — *Peniophora fraxinea* (Pers.) Lundell *in* Lundell & Nannf., Fung. exs. suec. Fasc. 1–2: 29 no. 84. 1934. — *Peniophora cinerea* var. *interrupta* (Pers. ex Fr.) Bourd. & G. *in* Bull. Soc. mycol. France **28**: 407. [1913]. — Type: Germany; in herb. Persoon (L 910.263–1340).

?*Thelephora leucocoma* Pers., Mycol. europ. **1**: 151. 1822; cf. Fries, Epicr. 565. 1838, Hym. europ. 656. 1874 ("vix diversa"). — *Thelephora melaloma* Chev., Fl. gén. Paris **1**: 88. 1826 ("Pers."). — Type locality: France, Paris, Botanic Garden.

Thelephora limitata Chaill. *ex* Fr., Elench. **1**: 222. 1828. — *Corticium limitatum* (Fr.) Fr., Epicr. 565. 1838. — *Peniophora limitata* (Fr.) Cooke *in* Grevillea **8**: 21 *pl. 123 f. 7.* 1879; Mass. *in* J. Linn. Soc., Lond. (Bot.), **25**: 145. 1889.

Thelephora montagnei Balbis, Fl. lyon. **2**: 293. 1828; cf. Montagne *in* Ann. Sci. nat. (Bot.) II **5**: 338. 1836 (referred to *Thelephora limitata*; "... l'antériorité reste au nom donné par Fries") and Fr., Epicr. 565. 1838.

Corticium fraxineum f. *asperum* Roum. *in* Rev. mycol. **16**: 110. 1894. — Type-distribution: Roum., Fung. exs. No. 6517.

DESCRIPTION & ILLUSTRATIONS.—Eriksson *1950:* 56 *fs. 18, 19* (*Peniophora fraxinea*).

Now that it has been decided that Fries's "Elenchus" is to be considered part of his "Systema", the correct name of *Peniophora fraxinea* appears to be a recombination based on *Thelephora limitata.*

Thelephora cinerea var. "*Th. interrupta*" Pers. and *T. fraxinea* Pers. are apparently nothing but two names for the same collection. The type is labelled "*Thelephora fraxinea / cinerea* β *interrupta* Syn. fung. Hab. in Germania" (Herb. Lugd.-Bat. no. 910.263–1340). The type of *Thelephora limitata* was sent in by Chaillet; Eriksson (*l.c.*) does not mention having studied it.

Thelephora leucocoma, which was referred by Fries to *Thelephora limitata*, is

a very doubtful synonym. It was found "Ad ramos *Castaneae vescae* sepibus inservientes." The description is too brief to decide the point, but if indeed the present fungus were involved, it might have been based on old specimens that just started the formation of a new hymenial layer ("albidopallens"). I did not come across a specimen in Persoon's herbarium.

Cristella Pat. *emend.*

Cristella Pat., Hym. Europe 151. 1887.[1]

Hydnum [sect.] *Microdon* J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 453. 1888; P. Henn. *in* Nat. PflFam. **1** (1**): 144. 1898. — Type species (selected): *Hydnum farinaceum* Pers. ex Fr.

Tomentella P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 419. 1889; not *Tomentella* Pat., Hym. Europe 154. 1887; not *Tomentella* J.-Olsen *apud* Bref., Unters. **8**: 9. [1888]. — Type species (selected; cf. Donk *in* Taxon **6**: 119. 1957): *Corticium sulphureum* Pers.

Phlebiella P. Karst. *in* Hedwigia **29**: 271. 1890 ("*Phlebriella*"). — Type species (only original species): *Phlebia vaga* Fr.

Trechispora P. Karst. *in* Hedwigia **29**: 147. 1890; not *sensu* D. P. Rog. & Jacks. *in* Farlowia **1**: 328. 1943 & D. P. Rog. *in* Mycologia **36**: 73. 1944; not *Trachyspora* Fuck. *in* Bot. Ztg **19**: 250. 1861. — Type species (only original species): *Trechispora onusta* P. Karst. = *Poria candidissima* (Schw.) Sacc. — Cf. Donk (*1956c*: 4, 7).

Soppittiella Mass., Brit. Fung.-Fl. **1**: 106. 1892. — Type species (selected; cf. D. P. Rog. *in* Mycologia **36**: 78. 1944): "*Thelephora cristata*, Fr." [sensu Mass.]; cf. Donk (*1952*: 486).

Corticium sect. *Humicola* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 259. 1911 ("Groupe"); Hym. France 229. [1928]. — Type species (selected): *Corticium confine* Bourd. & G.

Poria sect. *Subtiles* Bourd. & G. *in* Bull. Soc. mycol. France **41**: 216. 1925; *emend.* Donk, Rev. niederl. Homob.-Aphyll. **2**: 221. 1933. — Type species (selected): *Poria subtilis* (Schrad. ex Fr.) Bres. [sensu Bres.].

This genus may be distinguished by the combination of the following characters. Fruit-body completely resupinate (in one species often with variously formed outgrowths), fragile, never frankly waxy to gelatinous throughout, white or pallid. Gloeocystidia and cystidia lacking. Basidia neither passing through, nor finally assuming, an urniform shape, ovoid or ellipsoid rather than subcylindrical or clavate when young, never producing more than 4 sterigmata. Hyphae (at least in fresh fruit-bodies) distinct, thin-walled, rather fragile as a rule, invariably with clamp-connections, with characteristic onion-shaped inflations at many of the septa.[2] Spores usually short, often more or less globular, small (about 3–6 μ long or in diameter), colourless or faintly yellowish; wall usually ornamented with often minute spines or warts (in a few species spores more or less star-shaped), may be smooth, non-amyloid. On rotten wood, humus, and other rotten vegetable matter.

Type species (only original species).—"*Crist. cristata*" = *Merisma cristatum* Pers. sensu Pat. = *Thelephora fastidiosa* (Pers.) ex Fr.

Examples.—

Cristella alnicola (Bourd. & G.) Donk, *comb. nov.* (basinym, *Grandinia alnicola* Bourd. & G. *in* Bull. Soc. mycol. France **30**: 254. 1914); **Cristella amianthina** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium amianthinum* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 260. 1911); *Corticium araneosum* (Höhn. & L.) Höhn. & L.; *Corticium ardosiacum* Bourd. & G.; **Cristella byssinella** (Bourd.) Donk, *comb. nov.* (basinym, *Corticium byssinellum* Bourd. *in* Rev. Sci. Bourbonn. **23**: 13. 1910); *Cristella candidissima* (Schw.) Donk *apud* W. B. Cooke *in* Mycologia **35**: 288. 1943;

[1] "*Cristella* Nut.", cited by Rafinesque (*1838*: 112) as a synonym of *Dispara* Rafin., is an error for "*Cristatella* Nutt." (1834).

[2] Bourdot & Galzin's description (*1928:* 229) of these structures runs: "Les boucles sont çà et là très développées, et l'hyphe se renfle insensiblement en tige d'oignon vers les noeuds, tantôt d'un seul côté de la cloison, tantôt des deux côtés, les renflements s'opposant bout à bout, plus ou moins obliquement."

Cristella confinis (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium confine* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 260. 1911); **Cristella farinacea** (Pers. ex Fr.) Donk, *comb. nov.* (basinym, *Hydnum farinaceum* Pers. *ex* Fr., Syst. mycol. **1**: 419. 1821); *Cristella fastidiosa* (Pers. ex Fr.) W. Brinkm. *in* Jber. westfäl. Prov.-Ver. **24**: 13. 1916; **Cristella filia** (Bres.) Donk, *comb. nov.* (basinym, *Corticium filium* Bres. *in* Ann. mycol., Berl. **6**: 43. 1908[1]); **Cristella invisitata** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Corticium invisitatum* H. S. Jacks. *in* Canad. J. Res. C **26**: 155. 1948); *Corticium leucobryophilum* (P. Henn.) Bourd. & G.; *Grandinia microspora* P. Karst *in* Bidr. Känn. Finl. Nat. Folk **48**: 365. 1889?; *Corticium petrophilum* Bourd. & G.; **Cristella polyporoidea** (Berk. & C.) Donk, *comb. nov.* (basinym, *Corticium polyporoideum* Berk. & C. *apud* Berk. *in* Grevillea **1**: 177. 1873), cf. D. P. Rog. & Jacks. *in* Farlowia **1**: 279. 1943; **Cristella probata** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Corticium probatum* H. S. Jacks. *in* Canad. J. Res. C **26**: 155. 1948); **Cristella sphaerospora** (Maire) Donk, *comb. nov.* (basinym, *Hypochnus sphaerosporus* Maire *in* Bull. Soc. mycol. France **21**: 164. 1905); **Cristella stellulata** (Bourd. & G.) Donk, *comb. nov.* (basinym, *Corticium stellulatum* Bourd. & G. *in* Bull. Soc. mycol. France **27**: 263. 1911); *Corticium submicrosporum* Litsch. *in* Mitt. bot. Inst. techn. Hochsch. Wien **4**: 92. 1927; **Cristella submutabilis** (Höhn. & L.) Donk, *comb. nov.* [basinym, *Corticium submutabile* Höhn. & L. *in* S.B. Akad. Wien (M.-n. Kl. I) **116**: 822. 1907]; **Cristella sulphurea** (Pers. ex Fr.) Donk, *comb. nov.* [basinym, *Thelephora sulphurea* (Pers.) *ex* Fr., Syst. mycol. **1**: 452. 1821 = *Corticium sulphureum* Pers., Obs. mycol. **1**: 38. 1796] = *Phlebia vaga* Fr., Syst. mycol. **1**: 428. 1821, see note below; *Sistotrema variecolor* (Bourd. & G.) Wakef. & Pears.

The following recapitulation is offered to bring out those features that have led to the classification of the species in different genera. It is not supposed to show the putative natural relationship between the species.

1. Spores ornamented. (Some of the species listed have been placed in *Hypochnus* Fr. ex Fr. emend. P. Karst. or *Tomentella* Pat.).
   2. Fruit-body may produce variable outgrowths (*Cristella* Pat.) but it often is strictly resupinate. — *Cristella fastidiosa.*
   2. Fruit-body strictly resupinate.
      3. Fertile surface of fruit-body 'even' (continuous or interrupted, often minutely granular) (*Corticium* Fr. *pr.p*). — *Cristella sphaerospora, C. submutabilis, C. stellulata, C. sulphurea.*
      3. Fertile surface of fruit-body not even.
         4. Fruit-body toothed (*Grandinia* Fr. emend. Bourd. & G. *pr.p.*). — *Cristella farinacea, Grandinia microspora, Cristella alnicola.*
         4. Fruit-body with porose hymenophore (*Poria* Pers. ex S. F. Gray *pr.p.*; *Trechispora* P. Karst.). — *Cristella candidissima.*
1. Spores smooth. Fertile surface of fruit-body 'even' (*Corticium* Fr. *pr.p.*). — *Cristella amianthina, C. byssinella, C. filia, C. confinis.*

Bourdot & Galzin already indicated the close mutual relationship of the species of the present genus, although they left its species in several pre-existing and traditional genera. The following quotation, from a note appended to *Corticium* sect. *Humicola,* clearly demonstrates that they envisaged this genus long ago:

"[Ces caractères permettent] de saisir un lien entre des espèces distribuées dans divers genres, où elles se trouvent isolées et sans affines. Telles sont: *Poria subtilis* Schrad. [= *Cristella candidissima*], *Daedalea sulphurea* Qt., *Odontia farinacea* Pers., *Thelephora fastidiosa* Fr. et *T. leucobryophila* P. Henn. Dans toutes ces espèces humicoles, on retrouve la spore asperulée, et les hyphes plus ou moins nettement ampullacées. Le groupe s'étend entre les Clavaires hydnoides (*C. byssiseda, byssacea* (*Hydnum himantia* Schw.), *Bresadolae* et *Bourdotii*) et le genre *Tomentella*." — Bourdot & Galzin (*1911:* 259–260).

Later on, in their classical "Hyménomycètes de France" (*1928*), in a similar manner they carved out the species now placed in the enlarged genus *Sisto-*

[1] For revised description, see Wakefield (*1952:* 47).

trema Fr. What I have done at previous occasions, when emending *Sistotrema* Fr. (Donk *1956c:* 4) and *Cristella* Pat. (in correspondence since 1932), has been nothing else but drawing the consequences by putting the pieces together Bourdot & Galzin already indicated as related, and looking for the correct generic names to be applied to the resulting genera.

In a previous paper (Donk, *1952*) it was pointed out that the name *Cristella* has to be applied in agreement with the fungus on which it was based rather than with the type of the specific name wrongly applied to its only species, as was contended by Rogers (*1944:* 78); the latter course would make *Cristella* a synonym of *Sebacina* Tul. Much the same applied to *Soppittiella* Mass. Hence the correct name for the genus is *Cristella* (1887) rather than *Phlebiella* P. Karst. (1890) or *Trechispora* P. Karst. (1890).

The type and only original species of *Cristella* is in some ways aberrant by the tendency to form towards the margin and on the surface of the fruit-bodies variable outgrowths, which are subulate or more often laciniate or pectinate. It is a pity that the generic name was coined on account of this particularity, which is found only in the type species.

Cristella, as emended above, includes most species of *Corticium* sect. *Humicola* as well as the corresponding species that Bourdot & Galzin left in *Grandinia* Fr. sensu Bourd. & G. and *Poria* Pers. ex S. F. Gray. Moreover a few species that had been classed with *Corticium** sect. *Pellicularia* Bourd. & G. proved to possess the onion–like inflations that make them members of *Cristella* rather than of *Athelia* Pers. A few species that Bourdot & Galzin brought into connection with the species of 'Humicola' are now excluded, for instance, *Corticium tulasnelloideum* Höhn. & L., which shows only some similarities in the spores but otherwise is very different (see p. 26 under *Xenasma* Donk), and *Poria trachyspora* Bourd. & G. which may be kept in a genus of its own, *Lindtneria* Pilát (*1938*). The latter genus is distinguishable by its coarse and irregular pores (where well-developed), the larger spores, and the lack of clamp-connections.

From the quotation given above from Bourdot & Galzin's work it will appear that these authors also associated with the Humicola-group, what they call the "Clavaires hydnoides". The principle species of this group are referable to *Kavinia* Pilát, which seems to belong to a different series.

Well developed specimens of *Grandinia farinacea* may sometimes have a much reduced subicular layer, so that the teeth may appear as almost isolated. Such forms have been confused with *Mucronella* Fr.

As previously indicated (Donk, *1956c:* 5), *Cristella* seems most closely related to *Sistotrema* Fr. emend. Donk. The only reliable character for separation is in the urn-shaped basidia of the latter genus; as to all other features there is some degree of overlapping (see p. 22).

One gets the impression that Parker-Rhodes (*1954:* 399) favours splitting up *Cristella* into *Soppittiella* Mass. (a later typonym of *Cristella*), with hyaline spores, and *Phlebiella* P. Karst., with coloured spores. The difference in colour is too slight to be of generic value, in my opinion.

It may be that *Corticium** sect. *Aegeritoides* Bourdot & Galzin (*1928:* 229) should be included in *Cristella*. Its only species is *Corticium aegeritoides* Bourd. & G. Its authors remarked about the latter: "Il est possible que cette petite espèce doive prendre place dans le groupe *Humicola* quoiqu'elle ne nous ait pas

Cristella	*Sistotrema*
Fruit-body invariably resupinate, never pileate (rarely with variously-shaped outgrowths).	Fruit-body generally resupinate, but in a few species reflexed portions may occur, or the fruit-body is typically more or less stalked.
Basidia with 2–4 sterigmata.	Basidia usually with 4–8 (mostly 6), in a few species with only 2–4, sterigmata.
Spores usually ornamented, quite smooth in few species only.	Spores nearly always smooth, exceptionally with minutely roughened surface.
Onion-shaped inflations invariably present.	Onion-shaped inflations rarely lacking.
Gloeocystidia lacking.	Gloeocystidia present in a few species.

encore montré les boucles ampullacées caractéristiques; elle croît dans les mêmes conditions, lieux humides."

Cristella farinacea (Pers. ex Fr.) Donk, *comb. nov.*

?*Odontia nivea* Pers. *in* Neues Mag. Bot. **1**: 110 *pl. 4 fs. 6, 7.* 1794 (= Tent. 30. 1797) (devalidated name). — *Hydnum niveum* (Pers.) Pers., Syn. Fung. 563. 1801 (devalidated name). — *Hydnum niveum* (Pers.) *ex* Fr., Syst. mycol. **1**: 419. 1821; Mérat, Nouv. Fl. Paris, 2e Ed., **1**: 37. 1821; Pers., Mycol. europ. **2**: 179. 1825. — *Acia nivea* (Pers. ex Fr.) P. Karst. *in* Medd. Soc. F. F. fenn. **5**: 42. 1879. — *Odontia nivea* (Pers. ex Fr.) Quél., Ench. Fung. 195. 1886. — *Grandinia nivea* (Pers. ex Fr.) Lundell *in* Lundell & Nannf., Fung. exs. suec. Fasc. 43–44: 20 no. 2140. 1953. — Type locality: presumably Germany.

Hydnum farinaceum Pers., Syn. Fung. 562. 1801 (devalidated name). — *Hydnum farinaceum* Pers. *ex* Fr., Syst. mycol. **1**: 419. 1821; Mérat, Nouv. Fl. Paris, 2e Ed., **1**: 37. 1821; Pers., Mycol. europ. **2**: 183. 1825. — *Acia farinacea* (Pers. ex Fr.) P. Karst. *in* Medd. Soc. F. F. fenn. **5**: 42. 1879. — *Odontia farinacea* (Pers. ex Fr.) Quél. *in* Bull. Soc. bot. France **26**: 231. 1879, misapplied; not *Odontia farinacea* Cesati *in* Atti Accad. Sci. Napoli **8** (3): 9. 1879. — *Grandinia farinacea* (Pers. ex Fr.) Bourd. & G. *in* Bull. Soc. mycol. France **30**: 253. 1914. — *Phlebiella farinacea* (Pers. ex Fr.) Bondarz., Trut. Griby 51. 1953 (incomplete reference to basinym).

Hydnum niveum var. "β. *H. fimbriatum*" Fr., Syst. mycol. **1**: 420. 1821; not *Hydnum fimbriatum* (Pers.) *ex* Fr., Syst. mycol. **1**: 421. 1821. — *Hydnum niveum* var. *fimbriatum* (Fr.) Pers., Mycol. europ. **2**: 180. 1825; Fr., Epicr. 519. 1838. — Type locality: Sweden.

Grandinia farinacea f. *sorediosa* Bourd. & G. *in* Bull. Soc. mycol. France **30**: 253. 1914. — Type locality: France.

DESCRIPTIONS & ILLUSTRATIONS.—Bresadola, *1897:* 99 (*Odontia*), microscopical details; Bourdot & Galzin, *1928:* 412 (*Grandinia*).

TYPE LOCALITY.—Presumably Germany. NEOTYPE: "*Hydnum farinaceum.* Prope Parisios", L 910.256–1393.

Several specimens bearing the name *Hydnum farinaceum* are to be found in Persoon's herbarium. Two of these are without a note of interrogation and were studied by Bresadola (*1897:* 99) who established the current interpretation: these specimens agree with Persoon's description and with Bresadola's interpretation, but they were both collected in France evidently after the publication of Persoon's "Synopsis"; hence, neither of them is the real 'type'. In absence of such a type, one of these two collections is here chosen as neotype: L 910.256–1393, "*Hydnum farinaceum.* Prope Parisios", label written by Persoon, specimen studied by Bresadola. Two other specimens, indicating on their labels some measure of uncertainty of Persoon's in their determination as *H. farinaceum*, are also the same species. One of the two remaining specimens also doubtfully identified by Persoon, I did not determine, while the other one is *Odontia bicolor* (A. & S. ex Fr.) Quél. Compare also Bourdot (*1932:* 219).

As to Fries's interpretation of *H. farinaceum* the following note will show that he confused several species:

"It is known that Fries misinterpreted *Hydnum farinaceum* Pers. (comp. *e.g.* Bresadola [Att Accad. Sci. Lett. Art. Agiati 3: 3 p. 99 ... (1897)]; Romell ap. Skottsberg, Nat. Hist. Juan Fern. a. Easter Isl. 2 p. 469, 1920; and Donk, Rev. nederl. Heterobas. en Homobas. 1 p. 140, 1931). A reëxamination of the authentical material in Hb. Fries (three collections from Femsjö) gives the following result. One is a mixture of *Odontia bicolor* (A. et S. ex Fr.) Quél. and *O. breviseta* (Karst.) John Erikss. A second is *Grandinia lunata* Romell ex Bourd. & Galz. The third is *Mycoleptodon litschaueri* Bourd. & Galz. — An additional gathering of later date (Västergötland: Vänersborg, leg. C. P. Laestadius) determined by Fries as '*Hydnum farinaceum* infans' is young *O. breviseta*."—Lundell (*1953*: no. 2140).

This might be taken as a basis for rejecting Persoon's name as applied by Fries in 1821. Rather than to seek for support to reject such a well-settled basinym as *H. farinaceum*, I prefer to look for arguments that may lead to maintainance of the current interpretation. These are not difficult to find: Fries's diagnostic phrase of 1821 includes the whole of Persoon's unaltered (except that "margine byssoideo" has become "ambitu subbyssino"), and thus it may be defended that it covers Persoon's original fungus completely and should be typified in accordance with the original description, that is, Persoon's!

Lundell (*1953:* no. 2140) replaced the name *Grandinia farinacea* (Pers. ex Fr.) Bourd. & G. by *Grandinia nivea* (Pers. ex Fr.) Lundell on account of "an authentic specimen in Hb. Fries (Femsjö, E. Fries)" that represents the present species "in a young (corticioid) but nevertheless determinable stage." The following remarks tend to show that here again the typification of an old name re-validated by Fries should not necessarily be based on a specimen in his herbarium.

The identity of *Odontia nivea* Pers. is, in my opinion, still an unsolved problem as no specimens could be found in Persoon's herbarium. It is often referred to *Hydnum farinaceum*, but information on which the original description is silent is needed to settle the point and to exclude, for instance, *Hydnum* barbajovis* sensu Fr. as a possibility. Fries's descriptive phrase of 1821 agrees so closely with Persoon's, that I feel obliged to consider it based on Persoon's original specimen(s)—whatever species they may represent.

Cristella fastidiosa (Fr.) W. Brinkm.

Corticium foetidum Pers. *in* Ann. Bot. (ed. Usteri) **15**: 15. 1795 (devalidated name), not *Merisma foetidum* Pers., Comm. Fungi clavaef. 92. 1797; not *Corticium foetidum* Berk. & Br. *in* Ann. Mag. nat. Hist. V **3**: 211. 1879. — *Merisma fastidiosa* Pers., Comm. Fungi clavaef. 97. 1797; Syn. Fung. 582. 1801; (devalidated name). — *Thelephora fastidiosa* (Pers.) *ex* Fr., Syst. mycol. **1**: 435. 1821. — *Merisma fastidiosa* (Pers. ex Fr.) Pers., Mycol. europ. **1**: 155. 1822. — *Corticium fastidiosum* (Pers. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 142. 1882; Bourd. & G. *in* Bull. Soc. mycol. France **27**: 261. 1911. — *Cristella fastidiosa* (Pers. ex Fr.) W. Brinkm. *in* Jber. westfäl. Prov.-Ver. **24**: 13 *pl. 2 f. 3.* 1916 ("Pat."); Lundell *in* Lundell & Nannf., Fungi exs. suec. Fasc. 43–44; 10 no. 2119. 1953. — *Phlebiella fastidiosa* (Pers. ex Fr.) Bondarz., Trut. Griby 51. 1953 (incomplete reference to basinym).

Hydnum alliaceum Weinm. *in* Flora **15** (2): 453. 1832; Hymeno- Gastero-myc. ross. 370. 1836. — *Odontia alliacea* (Weinm.) Fr., Epicr. 529. 1838. — Type locality: Russia, region of Leningrad (Petropolis). — Cf. Bres. *in* Ann. mycol., Berl. **18**: 70. 1920, = *Thelephora fastidiosa* (Pers.) ex Fr.

Corticium fastidiosum f. *communis* Bourd. & L. Maire *in* Bull. Soc. mycol. France **36**: 72. 1920. — Type locality: France.

MISAPPLICATIONS.— *Merisma cristatum* Pers. *sensu* Pat., Hym. Europe 151. 1887, descriptio generico-specifica (*Cristella*). — Cf. Rogers (*1944:* 78).

Clavaria laciniata "Bull." *sensu* P. Karst., Krit. Öfvers. Finl. Basidsv. Tillägg 3: 25. 1898 (= *in* Bidr. Känn. Finl. Nat. Folk **62**: 89. 1903) (*Cristella*).

DESCRIPTIONS & ILLUSTRATIONS. Patouillard, *1900:* 11 f. 28 (*Cristella cristata*); Bourdot & Galzin, *1928:* 231 (*Corticium fastidiosum*).

TYPE LOCALITY.—Presumably Germany.

Cristella sulphurea (Pers. ex Fr.) Donk, *comb. nov.*

Corticium sulphureum Pers., Obs. mycol. **1**: 38. 1796 (devalidated name). — *Thelephora sulphurea* (Pers.) Pers., Syn. Fung. 579. 1801 (devalidated name). — *Thelephora sulphurea* (Pers.) *ex* Fr., Syst. mycol. **1**: 452. 1821, at least in part. — *Hyphoderma sulphureum* (Pers. ex Fr.) Wallr., Fl. crypt. Germ. **2**: 577. 1833. — *Corticium sulphureum* (Pers. ex Fr.) Fr., Epicr. 561. 1838 ("*sulfureum*"). — *Lyomyces sulphureus* (Pers. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 241. 1882; *in* Medd. Soc. F. F. fenn. **9**: 54. 1882. — *Coniophora sulphurea* (Pers. ex Fr.) Quél., Ench. Fung. 212. 1886; Mass. *in* J. Linn. Soc., Lond. (Bot.) **25**: 132. 1889. — *Hypochnus sulphureus* (Pers. ex Fr.) J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 417. 1888. — *Tomentella sulphurea* (Pers. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 419. 1889.

Phlebia vaga Fr., Syst. mycol. **1**: 428. 1821. — *Odontia vaga* (Fr.) P. Karst. *in* Medd. Soc. F. F. fenn. **14**: 86. 1887. — *Grandinia vaga* (Fr.) P. Karst., Krit. Öfvers. Finl. Basidsv. Tillägg 3: 23. 1898 (= *in* Bidr. Känn. Finl. Nat. Folk **62**: 87. 1903). — *Caldesiella vaga* (Fr.) Pat., Essai taxon. Hym. 120. 1900. — *Hypochnus vagus* (Fr.) Kauffman *in* Bull. New York St. Mus. No. 179: 88. 1915. — *Phlebiella vaga* (Fr.) D. P. Rog. *in* Mycologia **36**: 79. 1944 ("Karst."). — Type locality: Sweden.

Athelia sericea Pers., Mycol. Europ. **1**: 85. 1822. — *Hypochnus sericeus* (Pers.) Wallr., Fl. crypt. Germ. **2**: 310. 1833. — Presumably isonyms of *Corticium sulphureum* Pers.

? *Hypochnus fumosus* Fr., Obs. mycol. **2**: 279. 1818 (devalidated name). — *Thelephora fumosa* (Fr.) *ex* Pers., Mycol. europ. **1**: 147. 1822. — *Corticium fumosum* (Fr. ex Pers.), Fr., Epicr. 562. 1838. — *Coniophora fumosa* (Fr. ex Pers.) P. Karst. *in* Rev. mycol. **3** (No. 9): 23. 1881; Mass. *in* J. Linn. Soc., Lond. (Bot.) **25**: 139. 1889; not/or *Coniophora fumosa* P. Karst. *in* Medd. Soc. F. F. fenn. **6**: 13. 1881? — *Hypochnus fumosus* (Fr. ex Pers.) Burt *in* Ann. Missouri bot. Gdn **3**: 239 *f. 30.* 1916. — *Tomentella fumosa* (Fr. ex Pers.) Pilát *in* Bull. Soc. mycol. France **51**: 409. 1936. — Type locality: Sweden. — According to Bres. *in* Atti Accad. Agiati III **3**: 111. 1897 = "*Corticium sulphureum* Pers. ... (nec. Fr.)."

Odontia fusca Cooke & Ell. *in* Grevillea **9**: 103. 1881. — Type: U.S.A., New Jersey (J. B. Ellis 3429). — Cf. Rogers & Jackson (*1943:* 308), = *Corticium sulphureum* (Pers. ex Fr.) Fr.

? *Tomentella menieri* Pat., Tab. anal. Fung. **2**: 32 no. 580. 1886. — *Thelephora menieri* (Pat.) Sacc., Syll. Fung. **6**: 547. 1888. — Lectotype: France, Nantes (Menier). — Considered by Patouillard (*l.c.*) to be the sporulating stage of *Hypochnus fumosus* Fr., Obs. mycol. **2**: 279. 1818.

Odontia tenuis Peck *in* Rep. New York St. Mus. **44**: 134. 1891. — Type locality: U.S.A., New York, Salamanca. — Cf. Rogers & Jackson (*1943:* 309), = *Cortici m sulphureum* (Pers. ex Fr.) Fr.

Hypochnus filamentosus Burt *in* Ann. Missouri bot. Gdn **13**: 320. 1926; not *Hypochnus filamentosus* Pat. *in* Bull. Soc. Mycol. France **7**: 163. 1891. — Cf. Rogers & Jackson (*1943:* 309), = *Corticium sulphureum* (Pers. ex Fr.) Fr.

Tomentella lurida Skovsted *in* C.R. Trav. Lab. Calsberg, Sér. physiol. **25** (1): 14 *f. 7.* 1950 — Lectotype: Denmark, Zealand, Tokkekøb Hegn (A. Skovsted?).

MISAPPLICATIONS.— *Hypochnus fumosus* Fr. *sensu* Bres. *in* Atti Accad. Agiati III **3**: 111. 1897 (*Corticium*; as a synonym); Burt *in* Ann. Missouri bot. Gdn 3: 239 *f. 30.* 1916 (*Hypochnus*).

DESCRIPTIONS & ILLUSTRATIONS. Bresadola, *1897:* 111 ["*Corticium sulphureum* Pers. ... (nec Fr.)"]; Bourdot & Galzin, *1928:* 234 ("C[*orticium*] *sulphureum* Pers. ...; non Fries").

I would agree with Rogers & Jackson (*1943:* 308–309) that Persoon's *Corticium sulphureum* was also a part of Fries's assemblage of 1821 under the name *Thelephora sulphurea* (Pers.) ex Fr. Fries's description leaves little doubt in this respect, "... sulphurea ... Discus tum expallens, fere *cinerascens* ..." (italics are

mine)! Since Fries accepted Persoon's name (and also its type) and his description shows that he also included Persoon's fungus, there seems no need to typify the name as re-validated by Fries by anything else than Persoon's type.

The name '*Corticium sulphureum* Fr., non Pers.' has been often applied to a quite different fungus, but Rogers & Jackson (*1943*: 304–305) have demonstrated that the basis for this transfer has been very weak, if not erroneous. In any case *Corticium sulphureum* (Pers. ex Fr.) Fr. is a mere recombination of *Thelephora sulphurea* (Pers.) ex Fr. and, therefore, is based on the same type, and should not be differently applied.

3.—New genera

Xenasma Donk, *gen. nov.*[1]

Peniophora sect. *Gloeocystidiales* [subsect.] *Ceraceae* Bourd. & G., Hym. France 280. [1928]. — Type species (only species definitely included): *Peniophora chordalis* Höhn. & L. = *Peniophora pruinosa* (Pat.) H. S. Jacks.

Clitopilina Arnaud *in* Bull. Soc. mycol. France **67**: 178–180, 193. 1951 (nomen nudum; French description only). — Type species (only original species): *Clitopilina striata* Arnaud = *Peniophora pulverulenta* (Litsch.) H. S. Jacks.

Saprobicum. Receptaculum resupinatum, effusum, indeterminatum, plerumque pertenue, ceraceum vel gelatinosum, monomiticum, substrato bene affixum, superficie levi. Hyphae indistinctae, valde compactae, tenuissimae, tunica subgelatinosa. Cystidia desunt vel adsunt, hyphidia et glococystidia desunt. Basidia ex ipsis hyphis repentibus prodeuntia, generaliter basibus bifurcatis occultis, per faciem receptaculi plus minus distanter distributa, aseptata, late clavata vel cylindrica, sterigmata 2–7 gerentia. Sporae ellipsoideae usque globosae, minutae vel mediocres, incolores, parietibus levibus vel ornatis, haud amyloideis.

Fruit-body strictly resupinate, indeterminate, usually very thin and often difficult to detect, soft-waxy to gelatinous, drying to a varnish-like film or indurating, adherent; surface minutely pulverulent by basidia and (if present) cystidia; subicular layer thin, the hyphae parallel to the substratum, indistinct, slender, with gelatinised walls; hymenium consisting of more or less scattered basidia which repose directly on the subicular layer usually with hidden bases (metarobasidious). Hyphae slender, the walls thin and gelatinised. Cystidia lacking or present, either small, thin-walled, or larger and lower portion somewhat thick-walled, projecting. Basidia broad-clavate to cylindrical, lateral extensions of creeping hyphae (pleurobasidia), not abruptly narrowed at base, often rather short; sterigmata 2–7, short but rather broad at base, somewhat curved (horn-shaped). Spores nearly globular or ellipsoid-ellipsoid, small to medium-sized (4–12 μ), colourless; wall smooth or roughened (roughenings may disappear in KOH solution), non-amyloid.

On very rotten wood.

Type species.—*Peniophora rimicola* (P. Karst.) Höhn. & L.

Examples.—

Xenasma insperatum (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Corticium insperatum* H. S. Jacks. *in* Canad. J. Res. C **28**: 718. 1950); *Corticium lloydii* Bourd. & G. 1928 (not Bres.); *Corticium tenuiculum* Litsch.; **Xenasma praeterita** (H. S. Jacks.) Donk, *comb. nov.* (basinym, *Peniophora praeterita* H. S. Jacks. *in* Canad. J. Res. C **28**: 533. 1950); **Xenasma pruinosum** (Pat.) Donk, *comb. nov.* (basinym, *Corticium pruinosum* Pat., Cat. rais. Pl. cell. Tunis. 60. 1897); **Xenasma pulverulentum** (Litsch.) Donk, *comb. nov.* (basinym, *Corticium pulverulentum* Litsch.

[1] From ξένος, strange and (hyph)asma, an old term for a superficial mycelium or a resupinate fruit-body.

in Oesterr. bot. Z. **88**: 112. 1939); **Xenasma rimicolum** (P. Karst.) Donk, *comb. nov.* (basinym, *Corticium rimicolum* P. Karst. *in* Hedwigia **35**: 45. 1896); **Xenasma tulasnelloideum** (Höhn. & L.) Donk, *comb. nov.* [basinym, *Corticium tulasnelloideum* Höhn. & L. *in* S.B. Akad. Wien (M.-n. Kl. I) **117**: 1118. 1908].

The above mentioned species, as well as a few additional ones which might appear to belong in the present genus, are listed below, arranged according to their outstanding features.

1. Cystidia present, of two or three kinds: (i) small, cylindrical, the walls may be slightly thickened in basal portion, often with globular head or (ii) with 3–5 short, blunt, terminal lobes; (iii) much larger, cylindrical and somewhat tapering towards non-inflated top, the walls may be thickened in basal half, the thickened portions may remain as tubules in old collections (this type of cystidia is lacking in one species). Spores roughened (oil immersion lens), the roughening of spore wall mostly disappears quickly in KOH solution. Basidia 2–4-, 2–6-, or 4–7-spored, rather broadly clavate (5.5–8.5 μ wide). There is a tendency, not always evident in every collection, to the development of cord-like strands which branch over the surface of the fruit-body or appear at the margin. (After Jackson, *1950a.*) *Xenasma rimicolum, X. pruinosum, X. pulverulentum, X. praeteritum.*
1. Cystidia lacking. Basidia 2–4-spored, rather obovoid.
   2. Spores ornamented, the roughening of spore-wall not disappearing in KOH solution. *Xenasma tulasnelloideum, X. insperatum, Corticium tenuiculum.*
   2. Spores smooth (at least no roughening of spore-wall reported). *Corticium lloydii* Bourd. & G., ? *C. grisellum* Bourd., ? *C. subnitens* Bourd. & C., ? *C. sebacinaeforme* Bourd. & G., ? *C. pruina* Bourd. & G.

Clitopilina Arnaud is a generic name introduced for a new species that belongs to *Xenasma;* as no Latin description accompanies the name it was not validly published. I have carefully avoided to take up this misleading name. The type species is sufficiently well described and depicted to recognize it at once: "à thalle en couche compacte . . . lisse, céracée-visqueuse; cystides? en filament cylindrique, mince, renflé au sommet; basides saillantes, longues, se prolongeant inférieurement dans le thalle, à 4 sterigmates; basidiospores . . . *striées longitudinalement* . . ., ellipsoides, . . . de 9–11 μ long." No doubt this is the fungus described by Litschauer (*1939:* 112) as *Corticium pulverulentum* Litsch. and redescribed as *Peniophora pulverulenta* (Litsch.) H. S. Jacks. (*1950a:* 532 *f. 3*). Litschauer overlooked the roughening of the spores, which (as reported by Jackson) become "smooth in potassium hydroxide, [but] in water, lactic acid, or Melzer's solution [appear] adorned with longitudinal markings 0.5–1 μ apart, arranged in a broad spiral."

Arnaud's comparison with the agaric genus *Clitopilus* is not a happy one. In *Clitopilus* the spores are longitudinally ribbed, and in apical view their outline is angular. This is not the case in this corticium where the striae are bands of minute asperulations on otherwise even spores. *Peniophora pulverulenta* is the only species with such spores included in *Xenasma.*

The species of the present genus were placed by Bourdot & Galzin (*1928*) in the genera *Corticium* Fr. (not S. F. Gray) sensu Bourd. & G. and *Peniophora* Cooke. In contrast to the majority of species of these genera, the basidia of the species of *Xenasma* typically arise directly from a subicular layer of more or less repent hyphae: there is no well-developed subhymenium of ascending, branched hyphae. Jackson in particular has drawn attention to this group of which the limits are not yet exactly known. Much careful analytical work is still to be done before *Xenasma* and some other groups are sufficiently studied

and all the genera involved can be considered satisfactorily established. Jackson stated that its species, "possess common characteristics of such a distinctive and fundamental nature as perhaps to justify their ultimate segregation as a distinct genus[1] or even group of genera." He outlined the series thus:—

"*P*[*eniophora*] *rimicola* and its immediate relatives, taken as a group, are unrelated to other species in the genus *Peniophora* as that genus is ordinarily delimited. This group of species, however, because of the manner of growth and the characteristic method of the development of the basidia, often directly from the hyphae on the surface of the fructification, show close relationship to the more characteristic members included in the section *Athele* of *Corticium* as defined by Bourdot and Galzin. While the authors of this section included some species of doubtful relationship, typical members included there are *Corticium aurora* Berk. and *C. filicinum* Bourd. Species which have so far been recorded from North America, which belong in this relation, are *C. pseudotsugae* Burt (= *C. asserophilum* Litsch.), *C. tulasnelloideum* Höhn. & Litsch. [placed by Bourdot & Galzin in *Corticium* section *Humicola* Bourd. & G.], and *C. subinvisabile* Rogers. Some of the species of *Corticium* included by Bourdot and Galzin in their section *Ceracea*, subsection c, may also properly belong here."—Jackson (*1950a:* 525–526).

Continuing to cite Jackson we may characterize the average species of the series thus delimitated as follows:—

"Most of them are relatively inconspicuous forms, thin and delicate adherent, often with little development of subiculum or with subiculum indistinct. In consistency the fructifications vary from dry pruinose or crustose granular to subceraceous or ceraceous. In some the subiculum consists merely of a few horizontal hyphae from which the basidia may arise directly from hyphal cells or on short branches. In some of the ceraceous species the subiculum may be fairly well developed . . . In these there may be an initial basal layer of horizontal hyphae but the bulk of the subiculum is obscure and appears to consist for the most part of dead gelatinized hyphae with a surface layer of living hyphae from which the basidia and cystidia, if present, arise. The thickness of the fructification in such cases seems to be built up progressively by the activity of the surface layer. In this group also the basidia often arise directly from hyphal cells and then are commonly bifurcate at the base."—Jackson (*1950b:* 717).

I would underline Jackson's conclusions in many respects. Leaving out of account some odd species, described by Jackson as belonging to section *Athele*, and which are difficult to place, I would prefer to distribute the contents of the series he outlined over at least two genera, one with the subicular layer frankly waxy to gelatinous, *Xenasma*, and one with more or less arid subiculum, *Epithele* (Pat.) Pat., emended [type species, *Corticium typhae* (Pers. ex Fr.) Fr.]. The odd species not further considered are, for instance, *Corticium pauxillum* H. S. Jacks. (*1950b: 724 f. 9*), which recently has been transferred to the new genus *Heteromyces* L. S. Olive (*1957*: 433) and *C.* exilis* H. S. Jacks. (*1950b: 721 f. 4*), *C.* improvisum* H. S. Jacks. (*1950b: 720 f. 3*), *C.* inopinatum* H. S. Jacks. (*1950b: 718 f. 1*), and *C.* permodicum* H. S. Jacks. (*1950b: 721 f. 5*) which, judging from their descriptions and figures, are not easily accomodated in these two genera. This also applies to *Pleurocystidium thelae* Arnaud (*1951: 194 f. 1B, C*). As no Latin description was furnished neither the generic nor the specific name are validly published. The fungus is so far aberrant, if compared with the most of the species already mentioned, that it seems to have quite distinct hyphae easily discernable (Arnaud's figure) and a loose subicular structure (Arnaud's comparison with "*Hypochnus* Pat."). It has smooth, ovoid-pyriform spores, 6–8 μ long.

[1] "Such a procedure has already been proposed by Dr. D. P. Rogers in an unpublished paper read before the Mycological Society of America at the Philadelphia meeting in 1940."

The generic description contains in addition the following information:—

"*Pleurobasidium* n.g. (Corticiacées Pleurobasidiées), disposition générale des *Hypochnus* Pat. (nec auct.); mais basides à stérigmates se formant sur un diverticule latéral d'une cellule terminale des ramifications ultimes, 4 stérigmates . . ."—Arnaud (*1951:* 193).

Tylosperma Donk, *gen. nov.*[1]

Tomentella sect. *Eutomentella* [subsect.] *Pallidae* Bourd. & G., Hym. France 512. [1928]. — Type species (selected): *Tomentella trigonosperma* (Bres.) Höhn. & L. sensu Höhn. & L. = *Tylosperma fibrillosum* (Burt) Donk.

Corticium sect. *Goniosperma* Donk, Rev. niederl. Homob.-Aphyll. **2**: 35, 36. 1933. — Type species (selected): *Corticium trigonospermum* Bres. = *Hypochnus asterophorus* Bonord.

Saprobicum. Receptaculum resupinatum, effusum, indeterminatum, albidum vel pallidum, monomiticum, hymenio levi. Hyphae distinctae, laxe contextae, tenuiter sed firmule vel subcrasse tunicatae, fibulatae. Cystidia, gloeocystidia, et hyphidia desunt. Basidia aseptata, clavata, sterigmata 2–4 gerentia. Sporae minutae (circa 5–7μ), e latere visae triangulares, angulosae vel irregulariter nodosae, sub microscopio incolores vel stramineae, parietibus firmulis, haud amyloideis.

Fruit-body strictly resupinate, effused, thin, fragile to felty, white or pallid; hymenial layer almost arid to slightly waxy, subcontinuous, smooth; basal layer distinct, of loosely interwoven hyphae, not readily collapsing; margin fibrillose. Hyphae (basal ones) uniform (fruit-body monomitic), distinct, firm- to slightly thick-walled, with clamp-connections. Cystidia (inclusive of gloeocystidia) and hyphidia lacking. Basidia clavate, undivided; sterigmata 2–4, thin, almost straight. Spores rather small (about 5–7μ), in profile triangular, angulose to irregularly nodulose, hyaline to slightly yellowish under the microscope; wall rather firm, non-amyloid; not exhibiting repetition.

Saprobic, on humus, rotten bark and wood, and soil.

TYPE SPECIES.—*Corticium trigonospermum* Bres. = *Hypochnus asterophora* Bonord.

EXAMPLES.—

Tylosperma asterophora (Bonord.) Donk, *comb. nov.* (basinym, *Hypochnus asterophora* Bonord., Handb. allg. Mykol. 160. 1851); **Tylosperma fibrillosum** (Burt) Donk, *comb. nov.* (basinym, *Hypochnus fibrillosus* Burt *in* Ann. Missouri bot. Gdn **3**: 238. 1916).

Tylosperma, for the present, contains only two species which have been confused, and, yet, faithfully kept in two different genera, *Corticium* Fr. (non S. F. Gray) and *Tomentella* Pat. [*Hypochnus* Fr. ex Fr.], placed in two different families. Its distinctive characters which separate it, for instance, from *Hyphoderma* Wallr., and a related unnamed genus, and *Tomentella* Pat. (in a wide sense), are the angular-nodulose spores which are not coloured under the microscope (or at most only faintly yellowish); the distinct, loosely interwoven, clamped hyphae; and the whitish fruit-bodies. The genus belongs to the Corticiaceae rather than to the Thelephoraceae ('Phylacteriaceae') where the typical species of *Tomentella* belong.

[1] From τύλος, knot and σπέρμα, seed.

REFERENCES

ARNAUD, G. (1951) *in* Bull. Soc. mycol. France **67**.
BOIDIN, J. (1950a) *in* C.R. Acad. Sci., Paris **230**; (1950b) *in* Bull. mens. Soc. linn. Lyon **19**: 133–135; (1951) *in* Bull. Soc. Nat. Oyonnax **5**: 72–79; (1954), [unpublished thesis]; (1956) *in* Rev. Mycol. **21**.
BOURDOT, H. (1932) *in* Bull. Soc. mycol. France **48**.
BOURDOT, H. & A. GALZIN (1911) *in* Bull. Soc. mycol. France **27**; (1913) *in* Bull. Soc. mycol. France **28**. "1912"; (1928), Hym. France. "1927".
BOURDOT, H. & L. MAIRE (1920) *in* Bull. Soc. mycol. France **36**.
BREFELD, O. (1888), Unters. Gesammtgeb. Mykol. **8**. "1889".
BRESADOLA, G. (1897) *in* Atti Accad. Agiati III **3**.
BRINKMANN, W. (1909) *in* Bot. Ztg **67**; (1916) *in* Jber. westfäl. Prov.-Ver. W. u. K. **44**.
BULLER, A. H. R. (1922), Res. Fungi **2**; (1924), Res. Fungi **3**.
CORNER, E. J. H. (1948) *in* Trans. Brit. mycol. Soc. **31**; (1950), Monogr. Clav. (Ann. Bot. Mem. **1**).
DONK, M. A. (1931) *in* Meded. Nederl. mycol. Ver. **18–20**; (1933), Rev. niederl. Homob.-Aphyll. **2**; (1952) *in* Reinwardtia **1**: 483–486; (1954) *in* Bothalia **6**: 301–302; (1956a) *in* Taxon **5**; (1956b) *in* Reinwardtia **2**; (1956c) *in* Fungus **26**; (1957) *in* Taxon **6**.
ERIKSSON, J. (1950) *in* Symb. bot. upsal. **10** (5).
FRIES, E. M. (1828), Elench. Fung. **1**; (1849), Summ. Veg. Scand **2**; (1874), Hym. europ.
GREGOR, M. J. F. (1935) *in* Phytopath. Z. **8**: 401–419.
HÖHNEL, F. VON (1911) *in* S.B. Akad. Wiss. Wien (Math.-n. Kl., Abt. I) **120**: 445–447.
JACKSON, H. S. (1949) *in* Canad. J. Res. C **27**; (1950a) *in* Canad. J. Res. C **28**: 525–534; (1950b) *in* Canad. J. Res. C. **28**: 716–725.
JACKSON, H. S. & E. R. DEARDEN (1949) *in* Canad. J. Res. C **27**.
LENTZ, P. L. (1955), Agr. Monogr. U. S. Dep. Agr. No. 24.
LITSCHAUER, V. (1939) *in* Oest. bot. Z. **88**.
LOWY, B. (1954) *in* Bull. Torrey bot. Cl. **81**.
LUNDELL, S. (1941) *in* Lundell & Nannf., Fungi exs. suec. Fasc. 21–22: 13 no. 1019; (1953), *in* Lundell & Nannf., Fungi exs. suec. Fasc. 43–44: 20 no. 2140.
MAIRE, R. (1902) *in* Bull. Soc. mycol. France **18** (Suppl.).
MARTIN, G. W. (1944) *in* Lloydia **7**.
MCKEEN, C. G. (1952) *in* Canad. J. Bot. **30**.
NOBLES, M. K. (1956) *in* Canad. J. Bot. **34**: 104–130.
OLIVE, L. S. (1957) *in* Amer. J. Bot. **44**.
OVEREEM, C. VAN (1923) *in* Bull. Jard. bot. Buitenzorg III **5**.
PARKER-RHODES, A. F. (1954) *in* Trans. Brit. mycol. Soc. **37**.
PATOUILLARD, N. (1900), Essai taxon. Hym.
PILÁT, A. (1938) *in* Stud. bot. čechosl. **1**: 71–73.
RAFINESQUE, C. S. (1828), Sylva tellur.
ROGERS, D. P. (1935) *in* Univ. Iowa Stud. nat. Hist. **17** (1); (1944) *in* Mycologia **36**.
ROGERS, D. P. & H. S. JACKSON (1943) *in* Farlowia **1**.
TALBOT, P. H. B. (1951) *in* Bothalia **6**.
TASSINARI, M. (1956) *in* C.R. Acad. Sci., Paris **242**: 2661–2662.
WAKEFIELD, E. M. (1952) in Trans. Brit. mycol. Soc. **35**.
YEN, H. C. (1950) *in* Ann. Univ. Lyon **1949**.

TAXONOMICAL NOTES ON MOLLISIACEOUS FUNGI—V

On some species described by Velenovský

J. Gremmen
Forest Research Station, "De Dorschkamp", Wageningen

In this paper a revision is given of a number of species which the Czech mycologist J. Velenovský described in the genera *Mollisic*, *Pyrenopeziza* and *Tapesia*.

In 1934 Velenovský (l.c.) published his Monograph on the Discomycetes of Bohemia, whereas more Discomycetes were described in Novitates Mycologicae, 1939, and in Novitates Mycologicae Novissimae, 1947. Anyone interested in this group of fungi will be struck by the extravagant number (about 1100) of new species described by this author. One cannot conceive that so many new species would have been observed by a single person. Velenovský himself declares: "Die Discomycetenliteratur ist gering. Die umfangreichen Monographien Boudiers sind zwar gut, wir finden hier aber trotz allem Bestreben nur spärliche, mit dem böhmischen gemeinschaftliche Arten. Offenbar beherbergen die warmen Gegenden Frankreichs andere Formen als die rauhen Gebiete Böhmens und Deutschlands, was desgleichen die grossen Hymenomyceten bestätigen."

Probably Velenovský did not have sufficient time to study the literature pertaining to this large group of fungi, or the literature may not have been accessible to him. His conceptions concerning taxonomy are not in agreement with the present Rules, since he declares: "Ich sehe fernerhin nicht ein, warum sollte ein Autor gerügt werden, wenn er eine neue Pilzart beschrieben hat, welche schon vor etlichen Jahren von einem anderen Autor beschrieben worden ist" and "Ich lasse mir auch von keinem botanischen Kongresse etliche Gesetze über die Priorität und die Publicationsweise diktieren."

From a revision of the genus *Orbilia* (Svrček, 1954), it appeared that out of 63 species described as new by Velenovský, only seven are good species and one is a new variety of *Orbilia luteo-rubella* (Nyl.) Karst. The remainder proved identical with species already known from other parts of Europe, described by Fries, Karsten, Boudier, Von Höhnel or Rehm.

While working on *Mollisia* and its allies, the present author was in the position to investigate some of Velenovský's species, which was made possible by Dr M. Svrček who sent some types and specimens on loan from Velenovský's herbarium in the National Museum at Prague. A number of species asked for, however, were lacking, whereas in a few cases the material was so poor, that it could not be sent on loan. The quality of the collections received was often very bad, only consisting of minute fragments of the host, bearing but a few apothecia.

Although the number of fungi investigated by the present author is small, most of the species erected by Velenovský have to be rejected, whereas only one species, *Tapesia tormentillae* Vel., can be maintained.

1. Mollisia chenopodii Vel., Monogr. 120

Type-material, nr. 152203, Mnichovice: Hubáčkov, 7. 1933, leg. *J. Velenovský* (PR).

Although Velenovský's figure suggests a *Mollisia*, no definite opinion on its identity can be given, since the material lacks apothecia. Only a few perithecia belonging to the genus *Pleospora* were present.

2. Mollisia genistae Vel., Monogr. 121

Nr. 152251, Mnichovice; infra Klokočná, on *Galium aparine*, 10. 1933, leg. *J. Velenovský* (PR).

This collection contains some apothecia of the fungus *Pezizella eburnea* (Rob.) Dennis. Without any doubt Velenovský's diagnosis refers to the same fungus. The present author's measurements of the asci and ascospores are respectively: 25–38 × 4–5 μ and 6–8 × 1.5 μ.

Nr. 152279, Mnichovice: Božkov, on *Genista germanica*, 7. 1938, leg. *J. Velenovský* (PR).

This fungus is *Tapesia melaleucoides* Rehm. The apothecia have a brownish yellow hymenium. Asci and ascospores are: 46–50 × 4–5 μ and 6.5–8.5 × 2–2.5 μ (present author's measurements).

3. Pyrenopeziza comari Vel., Monogr. 149

Dr M. Svrček in his letter wrote that he could not detect any ascosporic fungus on the leaves of the host. He only observed an excipulaceous fungus, and supposed that Velenovský confused this fungus with an Ascomycete. The spores were found identical with the measurements given by Velenovský in his diagnosis.

4. Tapesia angelicae Vel., Monogr. 403

Type-material, nr. 153150, Mnichovice: Božkov, on *Angelica silvestris* (in palude), 5. 1939, leg. *J. Velenovský* (PR).

Not a single apothecium could be found on the substratum.

5. Tapesia callunae Mout. *in* Bull. Soc. Roy. Belge **36**: 15. 1897.

Nr. 153155, Mnichovice, on *Calluna vulgaris*, 3. 5. 1934, det. et leg. *J. Velenovský* (PR).

A great many well-developed apothecia were found which pertain to *Tapesia melaleucoides* Rehm. Asci 46 × 4 μ. Ascospores 7.5–8.5 × 2 μ (author's measurements).

Velenovský states: "Diagnosis autoris bene respondet nostrae *Pezizae*, mentio tantum hypothalli non fit. Rehmii *T. melaleucoides* e *Calluna* citata est idem." His identification with a fungus of Mouton (1897) seems an error, since Mouton never gave a description of *Tapesia callunae*. Velenovský probably confused it with *Pezicula callunae* Mout., of which the asci measure 90–100 × 15 μ and the ascospores 20–22 × 6 μ. This fungus is quite distinct from *T. melaleucoides* Rehm.

6. Tapesia centaureae Vel., Monogr. 137

Lectotype: MNP 153109, Mnichovice, on *Centaurea jacea*, 7. 1931, leg. *J. Velenovský* (PR).

The apothecia in this packet are identical with those of *Mollisia revincta* (Karst.) Rehm. Velenovský in his Monograph, however, mentions: "... extus dense breviter hirtula (pili 15–22 × 5, 3–4 cell., obtusi)." This certainly demonstrates that his material of *Tapesia centaureae* was a mixture of several species of which the hairy one may be a representative of the genus *Dasyscyphus* or perhaps the fungus *Pirottaea brevipila* (Rob.) Boud.

7. TAPESIA JACEAE Vel., Monogr. 137

According to Dr M. Svrček the material is too poor to be sent on loan. He informs that it is certainly not a *Mollisia* or a *Tapesia*, but a true *Pezizella*.

8. TAPESIA MYOSOTIDIS Vel., Monogr. 403

Type, nr. 153149, Mnichovice: in valle infra Božkov, on *Myosotis palustris* (in palude), 29. 5. 1934, leg. *J. Velenovský* (PR).

On this substratum very minute apothecia of a *Pezizella* occur.

9. TAPESIA PHRAGMITIS Vel., Monogr. 141

Cotype, nr. MNP 153152 (PR).

The material has been regarded as "original" by Velenovský. The apothecia belong to the species *Tapesia hydrophila* (Karst.) Rehm.

10. TAPESIA PSEUDOTAPESIA Vel., Monogr. 136

Dr M. Svrček states that the material only contains 1 or 2 apothecia which are neither a *Mollisia*, nor a *Tapesia*, but probably a species of the genus *Pezizella*.

11. TAPESIA SUBFUSCA Vel., Monogr. 137

Type, nr. 153116, Mnichovice: Kunice, in *Chaerophyllo hirsuto* ad rivum, 7. 1931, leg. *J. Velenovský* (PR).

This specimen is in a bad state and probably contains remnants of the apothecia of *Mollisia pastinacae* Nannf., although the spore-measurements in Velenovský's diagnosis do not confirm this assumption.

12. TAPESIA TORMENTILLAE Vel., Monogr. 136

Type, nr. 149476, Mnichovice: Božkov, 30. 4. 1929, leg. *J. Velenovský* (PR).

Apothecia 200–250 μ across, greyish white, transparent. Hymenium 30 μ thick, colourless. Excipulum consisting of minute dark brown excipular cells, 3 or 4 μ in diam. Subiculum absent. Asci 32–35 × 3.8–4.8 μ. Ascospores 5.5–6.5 × 2 μ, colourless, one-celled. Paraphyses colourless, filiform.

This species is a very minute one and occurs on a rhizome of *Potentilla tormentilla*.

As far as the thickness of the asci and ascospores is concerned, Velenovský's measurements differ from those mentioned above.

13. Tapesia virescens Vel., Monogr. 136

Nr. 147922, Mnichovice: Myšlín, ad caul. herb., 11. 1927, leg. *J. Velenovský* (PR).

Part of the material consists of gramineous stems on which numerous fructifications of *Pezizella eburnea* (Rob.) Dennis occur.

Acknowledgements.—The author is greatly indebted to Dr M. Svrček, National Museum, Prague, for the loan of material from Velenovský's herbarium and for valuable information.

References

Mouton, V. 1897. Troisième notice sur des Ascomycètes nouveaux ou peu connus. *In* Bull. Soc. Roy. Belge **36**: 10–22.

Svrček, M. 1954. Revise Velenovského druhů rodu *Orbilia*. *In* Acta Mus. Nat. Pragae, **10** B, nr. 1.

Velenovský, J. 1934. Monographia Discomycetum Bohemiae. Pragae.

MICROFUNGI DECOMPOSING ORGANIC REMAINS OF PINES

J. Gremmen
Forest Research Station, "De Dorschkamp", Wageningen

In this paper a number of fungi are reported, many of which are pioneer colonisers, decomposing the trash of pines, more especially of *Pinus sylvestris*. It is probable that during the process the microclimate plays a selective role. Pine needles rich in carbohydrates are shown to have a mycoflora different from that on needles which are poor in these substances. In the decomposition of the former two subsequent stages may be distinguished depending on the water supply. Short descriptions supplement the key to the species treated.

Many investigations deal with the decomposition of plant debris in the soil, but very little information is available on the decay of organic remains above the ground. Chesters (1950) published a short report on some Ascomycetes associated with the decay of logs and branches of deciduous trees. Another detailed study in this field was contributed by Mangenot (1952). This author, too, investigated the mycoflora of some deciduous trees, listing the fungi which could be isolated from the trunks as well as the fruit-bodies found on them at different times during the year.

General considerations. –The annual leaf fall, together with the organic material which remains after the felling of trees in the woods, yields a great quantity of raw material accumulating on the ground. Decomposition of this debris is gradually brought about by many different micro-organisms. The present paper reports on a series of microfungi inhabiting dead pine material which are pioneer colonisers of needles, branches, twigs, cones and even trunks.

The biology of these organisms is still insufficiently known, yet it is of primary interest to know which factors determine their settlement on a substratum. A mycelium e.g. may penetrate a dying branch from an already colonised one. Ascospores are distributed by wind and may reach a suitable substratum over long distances. Pycnospores or conidia are disseminated to a suitable medium by rain drops or insects. The fungus that newly colonised the substratum may prevent another organism from settling on the same medium by means of the secretion of an antibiotic substance.

Colonisation of pine debris may occur in different ways and by various fungi as demonstrated by some examples.

Branches.—Branches of pines dying e.g. from the attack of a parasitic fungus are often inhabited by *Cenangium ferruginosum*. This organism, colonising the twigs when still attached to the trees, seems to be a genuine pioneer. Often the branches are completely colonised with the exclusion of any other organism. In this stage competition by other fungi seems to be impossible, probably because of the dry microclimate of the branches to which the apothecia of *Cenangium* are adapted. The excipulum is very tough and leathery, protecting the hymenium from drying up in a dry period, and uncovering it after a rain shower so as to facilitate the dissemination of the ascospores, until the environmental conditions become unfavourable again. It is this intermittent

activity that goes far to account for the longevity of the apothecium. After shedding of the twigs the microclimatic conditions for the fungus become more humid on account of the close contact with the ground. This causes the competition of other species to increase. Yet the apothecia of *Cenangium ferruginosum* may remain active for some time, ejaculating their ascospores, but other fungi start invading the branches, gradually dissipating *Cenangium*.

After trees have been felled it is common practice for the remaining branches and needles to be used as a fertilizer in the wood. One or two years afterwards a very rich mycoflora develops on this trash. The sudden increase of fungi – especially of Ascomycetes – may be accounted for by the abundance of carbohydrates in the debris, providing an excellent medium for a number of colonising fungi. Many of these are the so-called sugar-fungi, which are especially found on injured, moribund or dead plant tissues. On these cut-down branches many characteristic fungi may be recognized.

Valsa pini seems to be a pioneer too, often covering the branches entirely. Reproduction in this fungus is by means of numerous perithecia as well as pycnidia, the spores of which are present many times a year. *Valsa pini* often predominates on branches lying on the ground where its development seems to be favoured by wet conditions.

Other species to be observed on dead twigs or branches are: *Coryne sarcoides*, *Crumenula pinicola*, *Crumenula sororia*, and *Tympanis hypopodia*.

Needles. — Colonisation of the needles of felled trees is demonstrated by a series of other fungi, viz. *Cenangium acicolum*, *Dasyscyphus pulverulentus*, *Desmazierella acicola*, *Hyalotricha trichodea*, *Ophionectria scolecospora*, *Phacidium lacerum*, *Phialea acuum*, and *Sclerophoma pityophila*. These fungi prefer the needles rich in carbohydrates, those which have naturally fallen down being poor in this substance. Tentatively two successive stages in the decay of these needles may be distinguished, each stage being characterised by certain fungi, depending on the microclimate.

I. *Sclerophoma*-stage.—The needles are grey, lying in heaps under dry conditions or still attached to a succumbed tree, e.g. killed by *Fomes annosus*. Now and then these heaps may be wetted by rain, but they are soon dried out again by wind. Characteristic species: *Cenangium acicolum* and *Sclerophoma pityophila*.

II. *Desmazierella*-stage.—The needles are black, lying in heaps under wet or very wet conditions, almost in contact with or very near the soil. Characteristic species: *Dasyscyphus pulverulentus*, *Desmazierella acicola*, *Phialea acuum*, sometimes accompanied by *Ophionectria scolecospora*. Decomposition in this stage is distinctly more advanced than in the former, and there is no doubt that the *Desmazierella*-stage is the more progressive of the two stages.

In sections the hyphae of *Cenangium acicolum*, *Ophionectria scolecospora*, and *Sclerophoma pityophila* may be observed only to penetrate the chlorenchym of the needles which causes this tissue to shrivel and become brown. The central part of the needle, however, is not invaded by mycelium. The chlorenchym is rich in carbohydrates, whereas the central part is lignified and does not possess sugars. It is almost certain, therefore, that the fungi mentioned break down the carbohydrates, leaving alone the lignin and the cellulose.

The colonisation of naturally fallen needles and of needles shed after infection by a parasitic fungus, e.g. *Lophodermium pinastri*, both of which are poor in sugars, is quite distinct from the colonisation of needles rich in nutrients as mentioned above.

CONES.—Pine cones are also colonised by a number of characteristic microfungi, among which *Gorgoniceps aridula* and *Hyaloscypha hyalina* are regular occupants.

The fact that the species on cones are different from those on needles or branches may perhaps be explained by the difference in chemical composition of the substratum.

CONCLUSION.—In general, decomposition of organic remains in nature seems to happen along the following lines: (*a*) decomposition of the pectic substances; (*b*) decomposition of sugars; (*c*) decomposition of cellulose, and (*d*) decomposition of lignin.

The fungi mentioned in this paper are common inhabitants in the indigenous pine woods. It would be of interest to study the ecology of these organisms, so as to obtain an insight in their behaviour in such a complex biocoenosis as is a pine wood.

The material which has been collected and identified by the author is preserved in his herbarium, whereas most of the species have been isolated in culture for further study.

KEY TO THE SPECIES BEARING APOTHECIA

1a. Apothecia non-phacidiaceous 2
2a. Apothecia hairy 3
3a. Hairs dark brown or red-brown 4
4a. Hairs shorter than 1 mm 5
5a. Hymenium beige . . . . . 4. *Crumenula pinicola*
5b. Hymenium yellowish green . . . . . 5. *Crumenula sororia*
4b. Hairs 1 mm or longer . . . . . 8. *Desmazierella acicola*
3b. Hairs colourless or light brown 6
6a. Hymenium not orange 7
7a. Hymenium white or light brown, hairs without crystals 8
8a. Hymenium white or light brown, hairs pointed 9
9a. Hairs without bulbous base 10
10a. Hymenium white . . . . . 11. *Hyaloscypha stevensonii*
10b. Hymenium light brown, hairs with lumina 12. *Hyclostricha trichodea*
9b. Hymenium white, hairs with bulbous base 10. *Hyaloscypha hyalina*
8b. Hymenium pure white, hairs with globular apex . 19. *Phialea acuum*
7b. Hymenium greenish, hairs with apical crystals 7. *Dasyscyphus pulverulentus*
6b. Hymenium orange . . . . . 6. *Dasyscyphus calyciformis*
2b. Apothecia not hairy 11
11a. Apothecia not violet 12
12a. Primary ascospores only 13
13a. Ascospores needle-shaped 14
14a. Ascospores many-called . . . . . 9. *Gorgoniceps aridula*
14b. Ascospores one-celled . . . . . 13. *Lophodermium pinastri*
13b. Ascospores not needle-shaped 15
15a. Ascospores one-celled 16

16a. Ascospores longer than 10 μ 17
17a. Ascospores ovate . . . . . 2. *Cenangium ferruginosum*
17b. Ascospores ovate-acuminate . 1. *Cenangium acicolum*
16b. Ascospores less than 10 μ long . . . . 17. *Pezizella chionea*
15b. Ascospores one- or more-celled, longer than 20 μ 16. *Pezicula livida*
12b. Both primary and secondary ascospores . . . . . 21. *Tympanis hypopodia*
11b. Apothecia violet . . . . . 3. *Coryne sarcoides*
1b. Apothecia phacidiaceous . . . . . 18. *Phacidium lacerum*

KEY TO THE SPECIES BEARING PERITHECIA OR IMPERFECT FRUCTIFICATIONS

1a. With perithecia 2
2a. Perithecia black 3
3a. Perithecia with long ostiola . . . . . 14. *Melanospora chionea*
3b. Perithecia with short ostiola . . . . . 22. *Valsa pini*
2b. Perithecia orange-red . . . . . 15. *Ophionectria scolecospora*
1b. Without perithecia 4
4a. Conidiophores or basidium-like cells 5
5a. Conidiophores dark brown . . . . . 8. *Desmazierella acicola*
5b. Basidium-like cells with sterigmata . . . . . 3. *Coryne sarcoides*
4b. Pycnidia or similar fructifications 6
6a. Pycnidia not orange-red 7
7a. Spores not finger-shaped 8
8a. Spores one-celled, less than 20 μ long 9
9a. Spores bacilliform 10
10a. Spores 6–8 × 1 μ . . . . . 13. *Lophodermium pinastri*
10b. Spores 2–4 × 1 μ, often curved . . . 21. *Tympanis hypopodia*
9b. Spores different 11
11a. Spores ovate . . . . . 20. *Sclerophoma pityophila*
11b. Spores allantoid . . . . . 22. *Valsa pini*
8b. Spores one-or more-celled, longer than 20 μ . . . . . 16. *Pezicula livida*
7b. Spores finger-shaped, many-celled . . . . . 5. *Crumenula sororia*
6b. Pycnidia orange-red . . . . . 15. *Ophionectria scolecospora*

FUNGI FORMING MICROCONIDIAL FRUCTIFICATIONS

1a. Microconidia globular . . . . . 6. *Dasyscyphus calyciformis*
1b. Microconidia bacilliform . . . . . 16. *Pezicula livida*
see also 13. *Lophodermium pinastri*

1. CENANGIUM ACICOLUM (Fuck.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. 1 (3): 228, 1896

Apothecia 1–2 mm in diam., sessile or very short-stemmed. Hymenium light brown. Asci 70–100 × 7.5–11 μ. Ascospores 11.5–19 × 4–4.5 μ, colourless, 1-or 2-celled, 1- or 2-guttulate, ellipsoidal-acuminate. Paraphyses colourless, filiform, apices brown, club-shaped.

A very common species, on dead needles of *Pinus* spp.

2. CENANGIUM FERRUGINOSUM Fr. ex Fr., Syst. myc. 2: 187. 1822

Apothecia 1–2 mm in diam., sessile. Hymenium yellowish brown. Asci 80 × 14–15 μ. Ascospores 12–13 × 5–6 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform, apices somewhat thickened.

Common, on dead branches of *Pinus* spp.

3. CORYNE SARCOIDES (Jacq.) Tul., Sel. Fung. Carp. 3: 190. 1865

Apothecia 2–10 mm in diam., sessile. Hymenium violet. Asci 90–120 × 8–10 μ. Ascospores 10 15 × 3–5 μ, colourless, 1- or 2-celled, ellipsoidal, often somewhat curved. Paraphyses colourless, filiform.

The apothecial form is often accompanied by fructifications characterised by basidium-like cells with three to five sterigmata which bear colourless spores of 4 × 1 μ. This stage of the fungus has already been described by Von Höhnel (1902) as *Pirobasidium sarcoides* (Jacq.) v. Höhn.

Coryne sarcoides has recently been reported from Canada as associated with fungi causing heart rot in coniferous as well as deciduous woods (Etheridge, 1954, and Etheridge & Carmichael, 1955).

On dead branches of *Pinus sylvestris*, also occurring on dead branches of deciduous trees, particularly *Fagus*.

4. CRUMENULA PINICOLA (Fr.) Karst. *in* Bidr. Känn. Finl. Nat. Folk 210. 1871

Apothecia 1.5–2 mm in diam., stipitate, red-brown, hairy. Hymenium beige. Asci 75 × 9–11 μ. Ascospores 17–30 × 3.5–4.5 μ, colourless, 1- or 2-celled, ellipsoidal, acuminate. Paraphyses colourless, filiform. Hairs red-brown.

On dying, thick branches and trunks of *Pinus* spp.

5. CRUMENULA SORORIA Karst. *in* Bidr. Känn. Finl. Nat. Folk 211. 1871

Apothecia 1–2.5 mm in diam., stipitate, black, hairy. Hymenium yellow-green. Asci 86–114 × 11 μ. Ascospores 13–30 × 5.5 μ, colourless, 1-, 2- or 4-celled. Paraphyses colourless, filiform. Hairs greenish brown.

The imperfect form, *Digitosporium piniphilum* Gremmen, is characterised by black pycnidia, containing colourless or faintly yellow, many-celled finger-formed pycnospores (Van Vloten & Gremmen, 1953).

Crumenula sororia is often found associated with canker-like wounds on the trunks of *Pinus* spp., but it may also occur as a saprophyte.

On thick, dead branches and trunks of *Pinus* spp.

6. DASYSCYPHUS CALYCIFORMIS (Willd.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. 1 (3): 834. 1896

Apothecia 0.5–2.5 mm in diam., stipitate, orange, hairy. Asci 50–60 × 4–5 μ. Ascospores 5–7 × 2.5–3.5 μ, colourless, 1-celled, ellipsoidal. Paraphyses colourless, filiform. Hairs 70–90 × 3 μ, colourless, rough, septate.

The microconidial stage, often observed in nature, may also be obtained in vitro. The fructifications are yellow or orange-yellow, producing colourless, globose spores about 2 μ in diam.

On dead branches of *Pinus sylvestris*.

7. DASYSCYPHUS PULVERULENTUS (Lib.) Sacc., Syll. Fung. 8: 463. 1889

Apothecia about 1 mm in diam., with short stem, yellowish, hairy. Hymenium yellow. Asci 30–40 × 4 μ. Ascospores 4–5 × 1–2 μ, colourless, 1-celled, cylindrical-cla-

vate. Paraphyses colourless, mostly cylindrical, exceeding the asci. Hairs 30–70 × 3–4 μ, colourless or yellowish, rough, apices with irregular lumps of crystals.

Common, on dead needles of *Pinus* spp.

8. Desmazierella acicola Lib. *in* Ann. Sci. nat. **17**: 83. 1829

Apothecia 3–6 mm in diam., sessile, hairy. Hymenium yellow-brown. Asci 200–250 × 12–14 μ. Ascospores 18–20 × 8–9 μ, colourless, 1-celled, ellipsoidal. Paraphyses brown, ramified, pointed. Hairs dark brown, 1–1.5 mm long.

The conidial stage belongs to the Hyphomycete genus *Verticicladium* Preuss and consists of dark brown conidiophores bearing colourless, globose or pear-shaped conidia, 3–3,5 μ in diam.

The connection between both stages has been proved in culture (Gremmen, 1949).

Fairly common, on decaying needles of *Pinus* spp.

9. Gorgoniceps aridula Karst. *in* Bidr. Känn. Finl. Nat. Folk 185. 1871

Apothecia about 0.3 mm in diam., sessile or subsessile, brown or red-brown. Asci 100–135 × 11–12 μ. Ascospores 60–80 × 2–3 μ, colourless, many-celled, curved. Paraphyses colourless, filiform, apices somewhat thickened.

Conidial fructifications have been observed among some of the apothecia. Conidia about 45 μ long, colourless, 3-celled, club-shaped. Thusfar culture experiments failed to prove the relationship between conidial and apothecial stage.

On old cones and dead trunks of *Pinus* spp.

10. Hyaloscypha hyalina (Pers. ex Fr.) Boud., Hist. Class. Discomyc. Eur. 127. 1907

Apothecia 0.2–0.3 mm in diam., sessile, white, hairy. Asci 40 × 4–6 μ. Ascospores 10.5 × 2 μ, colourless, 1-celled, ellipsoidal. Hairs 30–45 μ long, colourless, with a bulbous base, tapering to a fine point.

Fairly common, on old cones of *Pinus sylvestris*.

11. Hyaloscypha stevensonii (Berk. & Br.) Nannf. *in* Trans. Brit. myc. Soc. 20: 206. 1936

Apothecia about 0.3 mm in diam., sessile, white, hairy. Asci 45–55 × 7.5 μ. Ascospores 13–15 × 3 μ, colourless, 1-celled, straight or somewhat curved. Hairs 20–30 μ long, colourless, tapering to a point.

On small, dead branches of *Pinus sylvestris*.

12. Hyalotricha trichodea (Phill. & Plowr.) Dennis *in* Myc. Pap. **32**: 76. 1949

Apothecia 0.4–0.6 mm in diam., sessile, light brown, hairy. Asci 35–38 × 4 μ. Ascospores 6 × 2 μ, colourless, 1-celled, 2-guttulate, ellipsoidal. Paraphyses colourless, filiform, apices pointed. Hairs 100–140 × 4 μ, colourless or light brown, aseptate, tapering, flexuous, with narrow lumen.

On decaying, black-coloured needles of *Pinus sylvestris*.

13. LOPHODERMIUM PINASTRI (Schrad.) Chév., Flore gén. env. Paris **1**: 430. 1826

Apothecia 0.5–2.5 mm in diam., black, hysteroid. Hymenium cream or light brown. Asci 120–150 × 10–14 μ. Ascospores 100–125 × 1.5–2 μ, colourless, 1-celled, needle-shaped. Paraphyses colourless, filiform.

Leptostroma pinastri Desm., the microconidial stage which develops on the living needles, is characterised by small linear fructifications which form colourless, bacilliform spores measuring 6–8 × 1 μ.

This fungus is a parasite of the needles of various *Pinus* spp. The apothecia (hysterothecia) develop on the dead, fallen needles.

14. MELANOSPORA CHIONEA (Fr.) Corda, Icon. Fung. **1**: 24. 1837

Perithecia 0.2–0.4 mm in diam., black, globular, with long ostiola measuring 500–700 μ. Asci 35–45 × 14–18 μ. Ascospores 10–12 × 8 μ, brown.

Common, on very much decayed black needles of *Pinus sylvestris*.

15. OPHIONECTRIA SCOLECOSPORA Bref. & Tav., Unters. Gesammt. Myk. **10**: 178. 1891

Perithecia about 0.5 mm in diam., gregarious, red or orange-red, globular. Asci 100–120 × 5–11 μ, with primary and secondary ascospores. Primary ascospores 30–50 × 2.5–3.5 μ, colourless, many-celled (44–79 × 2.5–4 μ according to Brefeld). Secondary ascospores 3.5 × 1–1.3 μ, colourless, 1-celled, spermatoid, curved, a great many per ascus.

The pycnidial form, *Diplozythia scolecospora* Bubák, has orange-red, papillate, globular pycnidia. Pycnospores 2.5–3 × 1 μ, colourless, one-celled.

Common, on dead needles and small twigs of *Pinus* spp.

16. PEZICULA LIVIDA (Berk. & Br.) Rehm *in* **26** Ber. Nat. Ver. Augsb. 112. 1881

Apothecia 0.5–2 mm in diam., sessile, orange or yellowish brown. Asci 77–103 × 15–18 μ. Ascospores 22–34 × 6–7 μ, colourless, 1-, 2- or 4-celled, ellipsoidal or somewhat curved. Paraphyses yellowish, filiform.

Cryptosporiopsis abietina (Rostr.) Petr. is the conidial stage, forming acervuli with cylindrical conidia which are 20–40 × 8–12 μ, colourless, 1–4-celled.

A microconidial form also associated with this fungus has minute, colourless, bacilliform spores.

A number of other coniferous hosts is inhabited by this fungus (Gregor. 1931).

Common, on dead branches and trunks of *Pinus* spp.

17. PEZIZELLA CHIONEA (Fr.) Dennis *in* Myc. Pap. **62**: 53. 1956

Apothecia up to 1 mm in diam., sessile, yellowish or reddish yellow. Asci 50–60 × 4–5 μ. Ascospores 6–8 × 1.5 μ, colourless, 1-celled, ellipsoidal-cylindrical, straight or slightly curved. Paraphyses colourless, cylindrical.

On old cones of *Pinus sylvestris*.

18. Phacidium lacerum Fr., Obs. myc. 2: 313. 1818

Apothecia 0.3–0.6 mm in diam., developing subepidermally. Hymenium after rupturing of the epidermis chocolate coloured or brownish. Asci 73–85 × 7.5 8.5 μ. Ascospores 9–11.5 × 4 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform.

By means of ascospores this fungus was cultured. Growth of the mycelium was fairly good, starting as a delicate, white mycelium which after ageing gradually changed colour into green-brown. After about one month an abundance of black pycnidia were formed, oozing cream or milky coloured sporehorns. The pycnospores were (11.5) 13.5 15.5 × 3–3.5 μ, one-celled, colourless, somewhat bacilliform.

It seems almost certain that this stage is identical with Von Höhnel's fungus *Ceuthospora pinastri* (Fr.) v. Höhn. *in* Mitt. Bot. Inst. Techn. Hoch. Wien 2 (4): 99–109. 1925]. According to Von Höhnel, *Ceuthospora pinastri* is identical with *Dothiorella pinastri* (Fr.) Sacc. and *Fusicoccum pinastri* (Fr.) Karst.

On dead needles of *Pinus sylvestris*.

19. Phialea acuum (A. & S.) Rehm *in* Rabenh., Krypt.-Fl., Zweite Aufl. 1 (3): 717. 1896

Apothecia 0.1–0.2 mm in diam., shortly stipitate, white, hairy. Hymenium white or cream. Asci 27–35 × 4 μ. Ascospores 4–5 × 2 μ, colourless, 1-celled, ovate. Paraphyses colourless, filiform. Hairs colourless, 15–30 μ long, club-shaped, finely punctate.

Beside the apothecial stage it was possible in vitro to obtain pycnidia, the pycnospores of which were 7–8 × 4 μ, colourless, 1-celled. This pycnidial stage seems to be connected with the apothecia and may be identical with the fungus *Phoma mediella* Karst.

Common, on dead very wet needles of *Pinus* spp.

20. Sclerophoma pityophila (Corda) v. Höhn. *in* Sitzber. Akad. Wiss. Wien 118: 1234. 1909

Pycnidia 0.3–0.5 mm in diam., with dark brown pseudoparenchymatous cell-walls. Pycnospores 5–7 × 2–3.5 μ, colourless, 1-celled, ovate.

Recently, Jahnel & Junghans (1957) mentioned *Sclerophoma pityophila* as a parasite of pine needles, although they failed to give definite proof of its parasitism: "Ob bei dem Kiefernaltholzsterben der Pilz die primäre Ursache oder eine sekundäre Folgeerscheinung ist, können wir nicht entscheiden." and "Nach unseren geringen Infektionserfolgen an gesunden Pflanzen müszte man annehmen, dasz normale Nadeln nicht infiziert werden können."

A very common fungus on dead needles of *Pinus* spp.

21. Tympanis hypopodia Nyl., Obs. Pez. Fenn. 72. 1868

Apothecia 0.5–1 mm in diam., sessile, black, cartilagineous. Asci 70–90 (110) × 9–12 μ, with primary and secondary ascospores. Primary ascospores 6–10 × 2–4 μ colourless 1- or 2-celled, fusiform. Secondary ascospores 2–3 × 1 μ, colourless, cylindrical or allantoid. Paraphyses colourless, filiform, forming a brownish epithecium.

The conidial stage, *Pleurophomella* sp., is characterised by black, globular or pear-shaped pycnidia, 0.1–0.3 mm in diam., containing pycnospores which are

2–4 × 1 μ, colourless, 1-celled, cylindrical or allantoid, formed on filiform conidiophores.

The connection between both stages has been proved in culture by Groves (1952).

On thick, dead branches of *Pinus sylvestris*.

22. VALSA PINI (A. & S.) Fr., Summa Veg. Scand. 412. 1849

Perithecia very minute, gregarious in a stroma, black, with short ostiola. Asci 30–32 × 5–6 μ. Ascospores 6–9 × 1.3 μ, colourless, 1-celled, allantoid.

The imperfect stage, *Cytospora* sp., has pycnidia with 4–5 × 1 μ, colourless, 1-celled, allantoid pycnospores.

On dead branches of *Pinus sylvestris*, very common.

REFERENCES

CHESTERS, C. G. C. 1950. On the succession of microfungi associated with the decay of logs and branches. *In* Trans. Lincolnshire Nat. Union 129–135.

ETHERIDGE, D. E. 1954. Occurrence of a purple agar-staining fungus with decay in Alberta. *In* Bi-Monthly Progr. Rep. **10** (4): 3–4.

——— & E. CARMICHAEL, 1955. Further observations on the occurrence of *Coryne sarcoides* (Jacq.) Tul. on spruce in Alberta. *In* Bi-Monthly Progr. Rep. **11** (6): 3.

GREGOR, M. J. F. 1931. A comparative study of growth-forms within the species *Dermatea livida* (B. & Br.) Phillips. *In* Ann. Bot. **45**: 73–90.

GREMMEN, J. 1949. De imperfecte vorm van *Desmazierella acicola* Lib. *In* Fungus **19**: 32–35.

GROVES, J. W. 1952. The genus *Tympanis*. *In* Canad. J. Bot. **30**: 571–651.

HÖHNEL, FR. VON, 1902. Fragmente zur Mykologie. *In* Sitzber. K. Akad. Wiss. Wien, Math.-Naturw. Kl. **111**.

JAHNEL, H. & B. JUNGHANS, 1957. Ueber eine wenig bekannte Kiefernkrankheit (*Sclerophoma pityophila*). *In* Forstwiss. Centralbl. **76**: 129–132.

MANGENOT, F. 1952. Recherches méthodiques sur les champignons de certains bois en décomposition. Thesis, Fac. Sci. Nancy.

VAN VLOTEN, H. & J. GREMMEN, 1953. Studies in the Discomycete genera *Crumenula* de Not. and *Cenangium* Fr. *In* Acta bot. Neerl. **2**: 226–241.

SUR QUATRE STROPHARIACEAE

H. S. C. Huijsman
Rijksherbarium, Leiden

(Avec 27 figures dans le texte)

Description de *Deconica crobula*, *Hypholoma elongatum*, *H. udum* et *Psilocybe turficola*, tous appartenant aux Strophariaceae (sous-famille Strophrioideae).

Il arrive fréquemment que l'on cherche en vain une description plus ou moins détaillée pour y comparer ses récoltes, même lorsqu'il s'agit d'Agarics assez communs. Aussi je crois faire oeuvre utile en donnant la description de quatre petites espèces peu rares sur les terrains qui leur conviennent et – sauf en ce qui concerne *Psilocybe turficola* décrit et figuré d'une façon remarquable par son auteur J. Favre–un peu négligées dans la littérature mycologique européenne.

A l'exception de l'examen microscopique des spores pratiqué postérieurement dans l'ammoniaque, les études ont été faites sur du matériel frais.

Deconica crobula (Fr.) Romg.—Figs. 1–6

Agaricus crobulus Fr., Epicr. 199. 1836. — *Naucoria crobula* (Fr.) Ricken, Blätterpilze 211. 1912. — *Deconica crobula* (Fr.) Romg. *in* Bull. Soc. myc. Fr. **58**: 128. (1942) 1944.

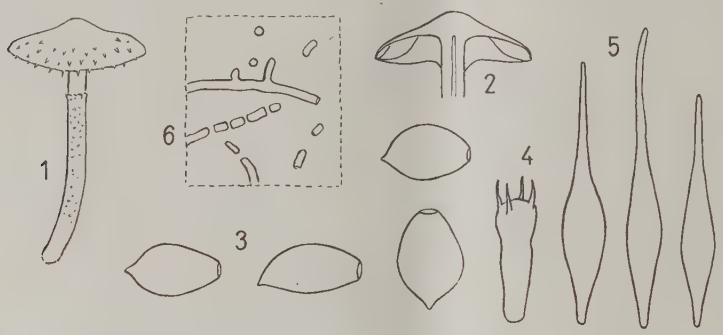
Chapeau dépassant à peine 12 mm, campanulé-conique, puis convexe, à mamelon large et obtus, hygrophane, subvisqueux, à pellicule élastique détachable, à mèches blanches vers la périphérie, imbriquées, apprimées, caduques et souvent excédentes, non strié à la marge, brun d'ombre, pâlissant à partir du centre, devenant ocracé ou ocracé-orangé, puis alutacé-ocracé ou ocracé-grisâtre; chair peu fragile, subconcolore, plus pâle que la surface; odeur et saveur insignifiantes. *Lamelles* serrées, ± 22, lamellules de trois ordres, alternant régulièrement, ± 2 mm de large, adnées-uncinées, brun-purpuracé; arête blanche, serrulée-fimbriée. *Pied* ± 15 × 1,5 mm, cylindrique, souvent courbé ou subflexueux, fistuleux, parfois avec une villosité blanchâtre à la base, à nombreux débris floconneux du voile blanc jusqu'à une zone annulaire peu distante du chapeau, parfois même avec un anneau floconneux, lacéré et évanescent, pulvérulent au sommet, à fond grossièrement fibrilleux d'un brun-grisâtre unicolore; chair fibreuse, tenace et ferme, subconcolore. *Sporée* d'un brun à peine pourpré (Séguy: 112).

Spores 6,1–7,4 × 4,4–5,1 × 3,7–4,2 μ, brun-jaunâtre sous le microscope, le plus souvent submitriformes ou plus ou moins citriformes, exceptionnellement allongées et presque cylindriques, à pore net. Basides 18–22 × 5–6 μ, tétrastérigmatiques, légèrement étranglées dans la partie supérieure. Cystides marginales formant une marge stérile, atteignant une longueur de 50 μ et une largeur de 7 μ, fusiformes-allongées, étirées au sommet. Pleurocystides absentes. Sous-hyménium ± $^3/_4$ hyménium. Trame des lamelles régulière à hyphes d'un diamètre de 7–12 μ. Trame du chapeau emmêlée. Epicutis à hyphes minces, parfois diverticulées, souvent fragmentées et très écartées par un mucilage. Boucles présentes.

Habitat, etc.—Assez commun sur des ramilles et des branches tombées de feuillus, isolé ou subisolé. Le spécimen figuré vient de la partie boisée du „Korenburger Veen" près de Winterswijk, 6-IX-1952.

On reconnaît facilement les spécimens jeunes et frais de ce *Deconica* aux méchules recouvrant élégamment le chapeau et à l'ornementation du pied.

L'espèce la plus proche, *D. inquilina*, ainsi que *D. crobula* considéré longtemps comme un *Naucoria*, croît le plus souvent sur des débris d'herbe, a le port généralement plus élancé et n'a pas le chapeau méchuleux.



Figs. 1–6. *Deconica crobula* (Fr.) Romg.: 1—carpophore 1 ×; 2—section du chapeau du même carpophore 1 ×; 3—spores 2000 ×; 4—baside 1000 ×; 5—cheilocystides 1000 ×; 6—fragment de la pellicule détachée du chapeau 1000 ×.

HYPHOLOMA ELONGATUM (Pers. ex Fr.) Ricken—Figs. 7–13

Agaricus elongatus Pers., Ic. et Descr. Fung. **1**: 3, pl. 1, fig. 4. 1798. — *Agaricus udus* γ *A. elongatus* (Pers.) ex Fr., Syst. myc. **1**: 292. 1821. — *Hypholoma elongatum* (Pers. ex Fr.) Ricken, Blätterpilze 250. 1912 (quoad nomen); J. Favre *in* Mat. Fl. crypt. suisse **10** (3): 147. 1948. — *Psilocybe elongata* (Pers. ex Fr.) Lange *in* Dansk bot. Ark. **9** (1): 30. 1936.

Chapeau 10–22 mm de large, conique-campanulé à mamelon large et peu prononcé, s'étalant bientôt, à marge restant longtemps incurvée, faiblement striée par transparance et pourvue de quelques débris du voile, jaune-olivacé ou olivacé-brunâtre à centre plus orangé, pâlissant à partir du disque et pouvant devenir sulfurin ou citrin vers la périphérie et même au centre; chair peu fragile, assez mince, subconcolore, odeur faible, flammuloïde, saveur insignifiante. *Lamelles* modérément serrées, ± 20, lamellules de trois ordres, horizontales, adnées, jaunes ou jaune-olivâtre, devenant d'un brun ocracé peu foncé; arête finement érodée-fimbriée et restant jaunâtre. *Pied* 30–50 ... 80 × 1–3 mm, subégal, à base souvent légèrement épaissie et villeuse, subflexueux, farci puis fistuleux, avec des traces soyeuses du voile, fauvâtre ou d'un jaune-fauvâtre, citrin ou sulfurin au sommet, plus foncé et allant jusqu'à un bistre-fauvâtre à la base; chair assez ferme, rigide et subélastique, subconcolore. *Sporée* brunâtre et non pourprée.

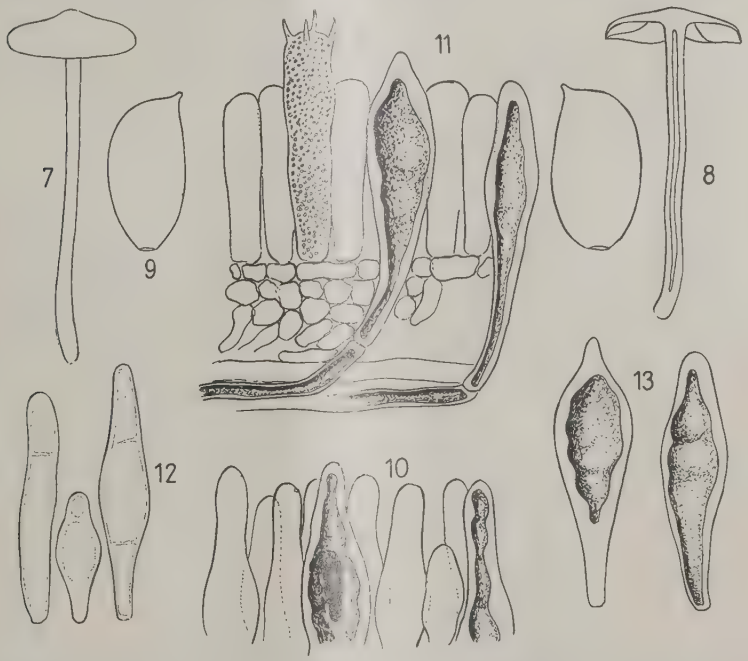
Spores 9,9–12,3 × 5,7–6,5 μ, elliptiques, à paroi assez mince, à pore petit, d'un jaune miel sous le microscope. Basides 24–32 × 8–12 μ, tétrasporiques, souvent avec un étranglement subapical. Arête des lamelles stérile par des cellules marginales hyalines, 20–40 × 5–12 μ, sublagéniformes ou -cylindriques, mêlées de nombreuses chrysocystides de forme variable, atteignant 60 × 15 μ, peu émergentes, à partie basale souvent longuement étirée et sortant de la profondeur du sous-hyménium ou de l'hyménopode. Cystides faciales nombreuses du type chrysocystide et ne différant pas des mêmes éléments de l'arête. Sous-hyménium mince, celluleux-subrameux. Hyménopode assez épais (20-30 μ), à hyphes d'un diamètre de 6 10 μ et à hyphes excrétrices nombreuses plus étroites couronnées d'une chrysocystide. Trame des lamelles subrégulière à cellules en boudin mesurant 55-90 × 9–15 μ. Trame du chapeau emmêlée à hyphes larges (12–20 μ) avec des dépots d'un pigment intercellulaire jaunâtre abondant. Epi-

cutis formant un réseau mince et lâche, constitué d'hyphes en partie désintégrées d'une largeur de 2 5 μ. Hypoderme $\pm$ 100 μ de large à cellules polygonales à membrane épaisse et très jaune. Boucles présentes.

HABITAT, etc.—Très commun sur les sols tourbeux de l'est et du sud de la Hollande. Les spécimens figurés ont été récoltes le 28-X-1947, au bord d'un marais près d'Oisterwijk.

Malgré ses spores brunâtres *H. elongatum* est inséparable des autres petits *Hypholoma*. Au besoin on pourrait prendre notre espèce pour un „*Flammula*", tel que *F. henningsii* ou une forme de l'espèce-collective *F. graminis*. Les lamelles de la première espèce, assez commune dans certains marais de notre pays, sont cependant dépourvues de chrysocystides et l'autre a des spores plus petites et subréniformes.

H. elongatum ressemble encore à *H. polytrichi* au sens de Ricken, dont Kühner a donné une description excellente et qui n'est pas rare à la lisière des bois de conifères humides. *H. polytrichi* a cependant la couleur du chapeau plus brune que *H. elongatum* et les spores en sont nettement plus petites. De plus *H. polytrichi* pousse le plus souvent isolé ou à peu près, tandis que l'autre se trouve de préférence en troupes plus ou moins nombreuses.



Figs. 7–13. *Hypholoma elongatum* (Pers. ex Fr.) Ricken: 7—carpophore 1 ×; 8—section d'un carpophore 1 ×; 9—spores 2000 ×; 10—marge stérile d'une lamelle 1000 ×; 11—coupe de l'hyménium avec deux chrysocystides d'origine profonde 1000 ×; 12—trois cheilocystides „ordinaires" 1000 ×; 13—deux chrysocystides 1000 ×.

H. elongatum, vraiment commun sur les sols diluviaux et acides de notre pays, y est moins strictement lié aux Sphaignes que dans certaines régions de l'Europe Centrale. Favre (1948) a observé que, dans les hauts marais du Jura, *H. elongatum* se trouve „uniquement sur les coussins de Sphagnum", tandis que dans le Parc National Suisse (1955) il vit aussi „sur d'autres mousses palustres". Chez nous on trouve cette espèce indifféremment sur les Sphaignes et les mousses palustres, sur le sol tourbeux nu des petites routes près des marais dans la province de Drenthe ou traversant le „Korenburger Veen", près de Winterswijk et même sur les débris pourris de *Carex*.

HYPHOLOMA UDUM (Pers. ex Fr.) Quél.—Figs. 14–19

Agaricus udus Pers., Syn. meth. Fung. 414. 1801. — *Agaricus udus* Pers. ex Fr., Syst. myc. **1**: 292. 1821. — Hypholoma udum (Pers. ex Fr.) Quél. *in* Bull. Soc. bot. Fr. **23**: 328 (XLIV). 1876. — Psilocybe uda (Pers. ex Fr.) Ricken, Blätterpilze 254. 1912.

Chapeau 8 15 mm de large, hémisphérique-campanulé ou campanulé-convexe, puis convexe, très obtus, à mamelon large et généralement peu marqué, marge longtemps incurvée, non ou à peine striée par transparance et dépourvue de débris du voile, non vraiment hygrophane bien que pâlissant par le sec, olive à fauve-olivâtre, à centre fauve ou fauve-orangé, passant à un jaune alutacé avec le centre restant fauvâtre ou fauvâtre-orangé, devenant ridulé-rugueux; chair subconcolore, odeur d'*Hypholoma*, saveur insignifiante. *Lamelles* peu serrées, ⊥ 21, le plus souvent 1–3 lamellules, ventrues, émarginées, assez épaisses, d'abord olive ou olive-ocracé, devenant de plus en plus purpurines, non pommelées; arête érodée-fimbriée, restant pâle. *Pied* 30–50 × 1,5–2,5 mm, cylindrique ou s'atténuant vers la base, fistuleux, rayé de fibrilles subsoyeuses, fauvâtre, plus foncé à la base, jaunâtre et légèrement pulvérulent au sommet; chair raide et subélastique, subconcolore. *Sporée* d'un beau violacé-purpurin.

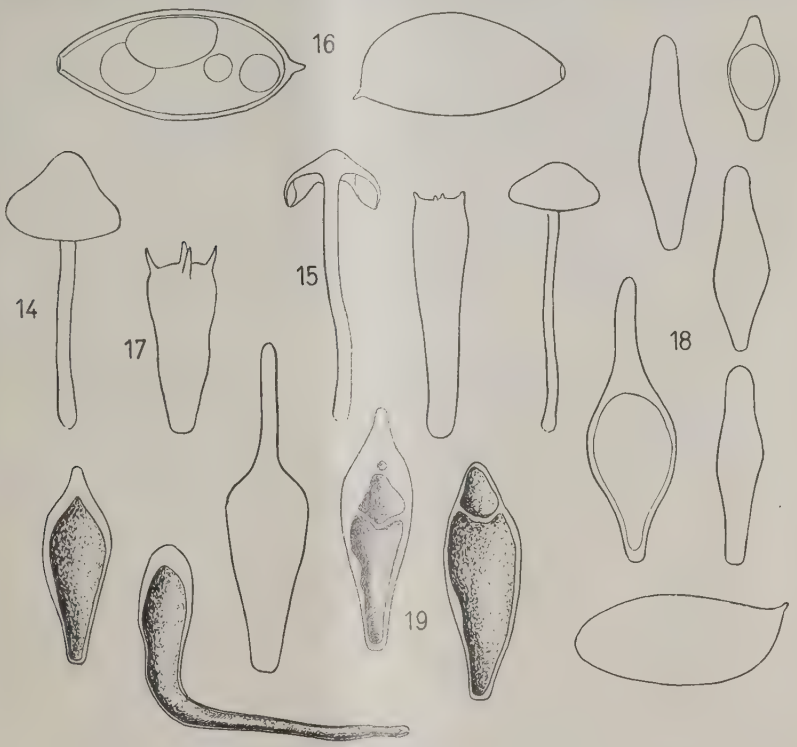
Spores 13,6–17,5 × 6,6–8,0 μ, étroitement elliptiques, à paroi lisse ou faiblement ruguleuse et assez mince (0,5 μ), à pore étroit, jaune-olivâtre lavé de brun-pourpré sous le microscope, guttulées. Basides tétrasporiques, subcylindriques ou subclaviformes, à étranglement subapical peu marqué 26–38 × 8–11 μ. Cystides marginales nombreuses, versiformes, atteignant 40 × 12 μ, hyalines. Cystides faciales assez nombreuses souvent immergées, atteignant 50 × 12,5 μ, parfois étirées au sommet, la plupart à inclusion jaune (chrysocystides). Sous-hyménium celluleux-rameux. Hyménopode à hyphes incrustées atteignant un diamètre de 6 μ et à nombreuses hyphes excrétrices couronnées le plus souvent d'une chrysocystide. Trame des lamelles régulière, à hyphes d'un diamètre de 8–16 μ et plus (certain élements sphériques atteignent un diamètre de 30 μ), légèrement incrustées et à pigment de membrane jaunâtre, parcourue d'hyphes excrétrices et à dépôts intercellulaires microcristallins en débris et en tablettes jaunes. Trame du chapeau emmêlée, à hyphes de 5–12 μ de large, par ailleurs comparable à la trame des lamelles. Epicutis très mince constitué d'hyphes incrustées couchées non disposées radialement, d'un diamètre de 1,5–5 μ et souvent désagrégées. Hypoderme composé de sphérocystes parcouru de nombreuses hyphes excrétrices. Flocules du sommet du pied à éléments terminaux fortement incrustés, ressemblant aux cheilocystides. Boucles présentes.

HABITAT, etc.—Pas rare sur le sol tourbeux des hauts-marais. Les spécimens figurés ont été récoltés le 8-XI-1947 dans le „Korenburger Veen" près de Winterswijk.

Hypholoma udum ressemble beaucoup à *Psilocybe turficola*. L'épicutis du premier n'étant pas gélifié, le chapeau n'en est pas pourvu d'une mince pellicule détachable comme chez le second. De plus le manque de chrysocystides et de toute coloration olivacée des lamelles de *P. turficola* aident à séparer les deux

espèces. Parmi tous ses congénères *H. udum* se caractérise par les grandes spores, dépassant le plus souvent 14 μ.

D'après Kühner et Romagnesi la surface des spores serait bassement marbrée-rugueuse. Dans les récoltes hollandaises certaines spores se révèlent en effet faiblement rugueuses, tandis que d'autres se montrent parfaitement lisses.



Figs. 14–19. *Hypholoma udum* (Pers. ex Fr.) Quél.: 14—carpophores 1 ×; 15—section d'un carpophore 1 ×; 16—spores 2000 ×; 17—baside 1000 ×; 18—cheilocystides 1000 ×; 19—chrysocystides de la face des lamelles 1000 ×.

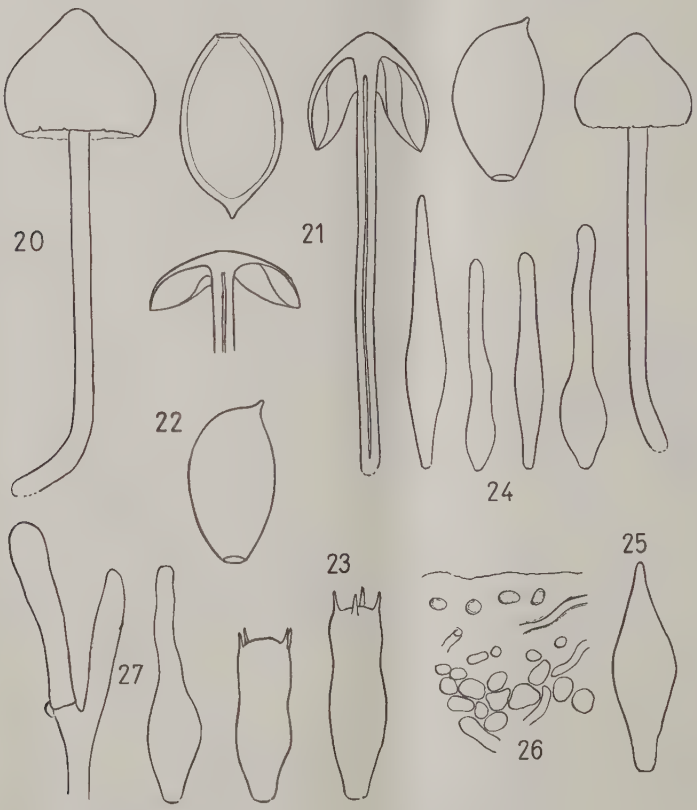
PSILOCYBE TURFICOLA J. Favre—Figs. 20–27

Psilocybe turficola J. Favre *in* Bull. Soc. myc. Fr. **55**: 196. 1939.

Chapeau 15–30 mm de large, campanulé-hémisphérique, s'étalant, à mamelon souvent large et peu individualisé, peu hygrophane, humide-subvisqueux, à pellicule séparable très mince et à peine élastique, ferrugineux-ocracé, surtout au centre, souvent subolivacé vers la marge qui est faiblement striée et qui peut porter de légers débris blanchâtres du voile, légèrement pâlissant et parfois un peu brillant par le sec; chair peu mince, paille-brunâtre sale, odeur faible, rappelant le bois de cèdre, saveur insignifiante. *Lamelles* peu serrées, environ 23, le plus souvent 3 lamellules, ventrues, 4–5 mm

de large, adnées-arrondies, gris-violacé puis noirâtres sans trace d'olive, pommelées; arête érodée-crénelée et blanche. *Pied* pouvant atteindre 60 × 3,8 mm, cylindrique ou légèrement comprimé, souvent flexueux ou (et) courbé en bas, devenant fistuleux, raide et sub-élastique, plus ou moins fibrilleux et parfois même avec des chinures peu apparentes provenant problablement d'un voile fugace, un peu farineux au sommet, paille-ocracé ou ocracé sale, plus foncé en bas, souvent avec un tomentum blanc à l'extrémité inférieure qui est attachée à des débris de Graminées (Cypéracées ?); chair subconcolore à moelle plus pâle. *Sporée* pourpré-noirâtre.

Spores elliptiques, 10,2–12,3 × 6,4–7,5 μ, à paroi assez épaisse ($\pm$ 0,6 μ), à pore évident, nettement pourprées sous le microscope. Basides 24 32 × 7,5–8,5 μ, tétrasporiques, souvent à constriction subapicale, mêlées d'éléments plus ou moins fusiformes, très riches en plasme (basidioles?) et mesurant 26–30 × 8–10 μ. Cystides marginales nombreuses, hyalines, étroitement fusiformes, parfois cylindriques, plus ou



Figs. 20–27. *Psilocybe turficola* J. Favre: 20—carpophores 1 ×; 21—section d'un carpophore 1 ×; 22—spores 2000 ×; 23—basides 1000 ×; 24—cheilocystides 1000 ×; 25—„basidiole" 1000 ×; 26—coupe tangentielle de l'épicutis et de l'hypoderme 1000 ×; 27—poils du sommet du pied 1000 ×.

moins flexueuses et obtuses, 25–40 × 4 8 ... (10) μ. Cystides faciales absentes. Trame des lamelles régulière, à hyphes le plus souvent de 3 8 μ de large. Hyphes de la trame du chapeau emmêlées à articles assez courts, d'un diamètre de 9 16 μ. Toutes les hyphes du carpophore avec un pigment de membrane et çà et là avec quelques incrustations; des dépôts d'un pigment intercellulaire dans tout le carpophore. Epicutis mince, environ 20 μ de large, gélifié, à hyphes d'une largeur de 2–4 μ, très écartées les unes des autres. Hyphes de l'hypoderme ± 5 8 μ de large, couchées et disposées plus ou moins radialement. Poils du sommet du pied ressemblant à des cheilocystides, cependant plus flexueux et plus obtus. Boucles présentes.

HABITAT, etc.—Sur le sol tourbeux des hauts-marais. Les spécimens figurés ont été récoltés le 8-XI-1947 dans le „Korenburger Veen" près de Winterswijk.

Cette espèce que peu de mycologues connaissent bien ne serait pas rare dans notre pays si les sols tourbeux vierges n'y étaient pas devenus d'une grande rareté. Dans les stations où elle pousse encore on la trouve souvent dans la compagnie de *Mycena megaspora*. On risque beaucoup de prendre *Ps. turficola* pour quelque petit *Hypholoma*. La pellicule séparable du chapeau et surtout l'absence de chrysocystides permettant aussitôt de distinguer *Ps. turficola* des représentants de ce dernier genre.

RÉFÉRENCES

FAVRE, J. 1948. Les associations fongiques des hauts-marais jurassiens et de quelques régions voisines. *In* Mat. Fl. crypt. suisse **10** (3).

——— 1955. Les champignons supérieurs de la zone alpine du Parc National suisse. *In* Résult. rech. sci. Parc Nat. suisse V, **33**.

KÜHNER, R. & ROMAGNESI, H. 1953. Flore analytique des champignons supérieurs. Paris.

SUÉGY, E. 1936. Code universel des Couleurs. *In* Encycl. prat. Natur. **30**.

THE STIPITATE HYDNUMS OF THE NETHERLANDS—II

Hydnellum P. Karst.

R. A. Maas Geesteranus
Rijksherbarium, Leiden

A revision of the genus *Hydnellum* is given. *Hydnellum acre* (Quél.) Donk, *H. concrescens* (Pers. ex Pers.) Banker, *H. queletii* (Fr. apud Quél.) P. Karst., and *H. zonatum* f. *vespertilio* (Berk.) Coker & Beers are reduced to synonymy. *Hydnellum velutinum* (Fr.) P. Karst., *H. scrobiculatum* (Fr. ex Secr.) P. Karst., *H. zonatum* (Fr.) P. Karst., and *Hydnum spongiosipes* Peck are considered to belong to a single species. The new combinations *Hydnellum velutinum* var. *scrobiculatum* (Fr. ex Secr.) Maas G., var. *zonatum* (Fr.) Maas G., and var. *spongiosipes* (Peck) Maas G. are proposed.

The application of a diluted solution of KOH has proved a useful additional means of distinction between species that in outward appearance resemble each other very much. However, the technique of applying the KOH matters a great deal, since the colour reaction of the flesh in one group of species (the group of *Hydnellum ferrugineum* and *H. velutinum*) proceeds very quickly in that the context stains dark violet, but turns olive green immediately afterwards. It certainly is not sufficient simply to apply a drop of the solution to any part of the cut surface of the context. In the lighter parts near the surface of the pileus one will very likely see no reaction at all, whereas in the darker parts of the pileus the successive stages of the quickly changing reaction, as the solution penetrates deeper layers of the flesh, will only result in a unicoloured, dingy greenish blotch. The best way is to slice off a thin portion of the cut surface of the context in the darker parts of pileus or stipe, and dipping it into a drop of the solution placed on a slide, watching the process under the dissecting microscope. An eight per cent solution gives a quick reaction and deep colours, a more diluted solution slows down the reaction but gives weak colours.

Hydnellum P. Karst.

Hydnellum P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879. — Type species: *Hydnum suaveolens* Scop. ex Fr., see Donk (1956: 96).

Carpophores terrestrial, stipitate, not fleshy, frequently confluent. Pileus covered with tomentum, anoderm. Tomentum of stipe usually binding vegetable debris. Context fibrous, tough, corky or woody when dry, zonate, homogeneous or, in some species, duplex, i.e. soft and spongy without, compact and hard within. Hymenium covering spines on underside of pileus. Spines becoming brown with maturity. Basidia tetrasporous. Spores subglobose to angular, coarsely tubercular, brown in the mass. Odour not of fenugreek.

As in *Sarcodon*, treated in a former paper (1956), the colour of the flesh, and the presence or absence of clamp connections in the hyphae allow us to divide the genus *Hydnellum* into several groups. To test the value of these groups, some American species have also been taken into consideration.

However, since not all American forms have been examined, the subdivision is of a provisional nature.

At present six groups may be recognised, some of which correspond with the taxa proposed by Pouzar (1956: 76). Groups 1–3 are characterised by the lack of clamp connections, groups 4–6 possess clamps.

Group 1 is characterised by the dark colour of the context which is purplish brown to ferruginous brown, and stains a deep violet in KOH solution, immediately changing into olive green. The taste is not acrid. When dry the firmer parts of the context in pileus and stipe are marked by whitish dots of excreted crystalline matter. *Hydnellum ferrugineum* and *H. velutinum* belong to this group which is the same as Pouzar's *Hydnellum* subgen. *Phaeohydnellum* sect. *Velutina*.

In group 2 the context shows yellowish to orange colours either in the cap or in the stipe or in both. In KOH the more intensely coloured part of the context assumes a dingy olive brown colour. Taste not acrid. No dots of excreted matter when dry. This group would correspond with Pouzar's subgen. *Phaeohydnellum* sect. *Aurantiaca*. It comprises *H. aurantiacum* and the American species *H. carolinianum* Coker, *H. complicatum* Banker, *H. earlianum* Banker, and *H. ferrugipes* Coker. The last-named species resembles, and is certainly closely allied to *H. caeruleum* of group 4 in having bluish colours in the context of the pileus, but the context is either blue for the greater part or shows patches of that colour, instead of being zoned with blue as is the rule in species of that group.

In group 3 the context is pallid in the cap, brownish in the base of the stipe, not discolouring in KOH. The taste is acrid and bitter. No dots of excreted matter when dry. *Hydnellum compactum* belongs here.

Group 4, comprising *H. caeruleum*, *H. suaveolens* (Scop. ex Fr.) P. Karst., and the American species *H. alachuanum* (Murr.) Coker & Beers, is characterised by the context being zoned with bluish lines. The blue parts become blue-green in KOH. Taste not acrid. There are no dots of excreted matter when dry. The corresponding taxon with Pouzar is his subgenus *Hydnellum*, except for the fact that it does not include *H. caeruleum*.

Group 5, called *Hydnellum* subgen. *Anomohydnellum* by Pouzar, has the context sulphur yellow near the surface of the pileus, more greenish further down, staining olive brownish in KOH. Taste none. No dots of excreted matter when dry. The only species is *H. geogenium* (Fr.) Banker.

Group 6 is characterised in having the context pale yellowish brown to pale pinkish brown in the pileus, darker in the stipe, hardly discolouring in KOH. The taste is very acrid. Dots of excreted matter more or less commonly present, staining red-brown in KOH. The group is based on a single species, *H. diabolus*, but it probably comprises also *Hydnellum rhizopes* Coker.

KEY TO THE EUROPEAN SPECIES

1a. Hyphae without clamp connections 2

2a. Context purplish brown to ferruginous brown, staining first dark violet in a solution of KOH, then olive green; firmer parts of context marked with whitish dots of excreted material when dried, **group 1** 3

3a. Pileus convex or plane, at most becoming depressed, velutinous covering long remaining unchanged, finally collapsing to azonate surface, releasing sap

wherever bruised, and staining dark red; no dots of excreted matter visible on surface when dried 4
4a. Tomentum white, becoming pale pinkish brown or yellowish brown; stipe equal or subbulbous below . . . . . *H. ferrugineum*, p. 60
4b. Tomentum whitish, turning cinnamon; stipe ventricose or with bulbous base, often constricted at top . . . . . *H. velutinum* var. *spongiosipes* p. 62
3b. Pileus depressed to infundibuliform, usually not plane, tomentum soon becoming matted or pitted, or collapsing to more or less zonate surface, darkening only in youngest parts when bruised, fairly "arid", often showing dots of excreted matter on surface when dried 5
5a. Context of pileus conspicuously duplex, spongiose covering much thicker than harder part . . . . . *H. velutinum* var. *velutinum*, p. 62
5b. Context of pileus not clearly duplex, softer part not thicker than harder part 6
6a. Pileus radially wrinkled or ridged or lamellate, concentrical zones few and not very conspicuous . . . *H. velutinum* var. *scrobiculatum*, p. 63
6b. Pileus finely radially striate, concentrical zones numerous, distinct *H. velutinum* var. *zonatum*, p. 64
2b. Context differently coloured, not staining violet in KOH (see introduction) 7
7a. Context yellowish in pileus, orange in stipe; taste mild, **group 2** *H. aurantiacum*, p. 52
7b. Context pallid in pileus, brownish in base of stipe; taste acrid and bitter, **group 3** *H. compactum*, p. 56
1b. Hyphae with clamp connections 8
8a. Context of pileus, at least in harder parts above spines, zoned with bluish lines, **group 4** 9
9a. Context orange-brown in stipe; odour of French beans or cucumber when cut in fresh condition, indistinctive when dry . . . . . *H. caeruleum*, p. 54
9b. Context deep blue in stipe; odour of toffees or cumarine when dry. (Not treated in this paper.) . . . . . *H. suaveolens*
8b. Context of pileus not zoned with bluish lines 10
10a. Context sulphureous in softer parts of pileus, more greenish in harder parts; taste none, **group 5**. (Not treated in this paper.) . . . . . *H. geogenium*
10b. Context of pileus pale pinkish brown or pale yellowish brown; taste very acrid, **group 6** . . . . . *H. diabolus*, p. 58

HYDNELLUM AURANTIACUM (Batsch ex Fr.) P. Karst.

Hydnum suberosum varietas β *aurantiaca* Batsch, El. Fung. Cont. 2: 103. 1789. — *Hydnum aurantiacum* Alb. & Schw., Consp. Fung. 265. 1805; *ex* Fr., Syst. mycol. **1**: 403. 1821. — *Hydnellum aurantiacum* (Batsch ex Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1880. — *Calodon aurantiacus* (Batsch ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 16. 1881. — *Phaeodon aurantiacus* (Batsch ex Fr.) J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 459. 1888. — Type: represented by Batsch, El. Fung. Cont. 2: pl. 40, fig. 222. 1789.

Hydnum floriforme Schaeff., Fung. Icon. **4**: 97. 1774 (pro parte); *ex* Secr., Mycogr. suisse **2**: 512. 1833 (misapplied, = *Hydnellum caeruleum*); not *Calodon floriforme* Schaeff. *sensu* Quél., Ench. Fung. 190. 1886 = *Hydnellum ferrugineum*. — *Hydnellum floriforme* (Schaeff. ex Secr.) Banker *in* Mem. Torrey bot. Cl. **12**: 159. 1906. — Type: represented by Schaeff., Fung. Icon. **2**: pl. 146, fig. 4. 1763.

Hydnum stohlii Rabenh. *in* Hedwigia **12**: 113. 1873 (cf. Bresadola, Icon. mycol. **22**: text to pl. 1052, 1932). — Type locality: Austria, Salzburg.

DESCRIPTIONS.—Bourdot & Galzin, Hym. France 458. 1928 (*Calodon*); Bresadola, Icon. mycol. **22**: text to pl. 1052. 1932 (*Hydnum*); Donk *in* Med. Nederl. mycol. Ver. **22**: 53. 1933; Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 470. 1934 (*Calodon*).

ILLUSTRATIONS.—Batsch, El. Fung. Cont. 2: pl. 40, fig. 222. 1789 (*Hydnum suberosum* var. β *aurantiaca*; recognisable); Bresadola, Icon. mycol. **22**: pl.

1052. 1932 (*Hydnum*; juvenile, passable); Fl. batava **25**: pl. 1955. 1920 (*Hydnum*; very good); Fries, Icon. sel. Hym. **1**: pl. 4. 1867 (*Hydnum ferrugineum*; old weathered specimens, according to Lundell, with red droplets thrown in to give an additional *H. ferrugineum*-character); Gillet, Champ. France pl. 313. 1878–1890 (*Hydnum*; passable); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 470. 1934 (*Calodon*; good); Maublanc, Champ. France, ed. 4, **2**: pl. 195(2). 1952 (*Calodon*; somewhat faded); Nikolajeva *in* Pl. cryptog. **9**: fig. 4. 1954 (somewhat unusual); Schaeffer, Fung. Icon. **2**: pl. 146, fig. 4 (recognisable), pl. 147, fig. 2–6 (very dubious). 1763 (*Hydnum floriforme*): Walty, Schweiz. Pilztaf. **3**: pl. 66. 1947 (*Calodon*; blue margin of cap erroneous).

Diagnostic characters.—Carpophores solitary or confluent. Pileus convex to plane or depressed, uneven to colliculose in centre, smooth or radially wrinkled towards margin, becoming more sharply wrinkled with age, excrescences in centre becoming more sharply pronounced or developing into pileoli, covered with soft velvety tomentum which collapses to smooth or pitted surface in centre, becoming radially fibrillose towards margin, azonate, white to cream when young, soon turning delicately orange or salmon, finally dingy yellow-brown to fulvous, margin long remaining paler. Stipe slender or, more often, stocky, ventricose or with bulbous base from thick spongiose covering, surface velvety becoming matted, bright orange, finally dark brown. Spines more or less decurrent, whitish, turning chocolate brown. Context in pileus not clearly duplex, softer parts gradually merging into harder parts, zoned with dark lines, yellowish above, turning dingy orange downwards, distinctly duplex and brownish orange in stipe, staining olive-brown in KOH. Odour mealy or of French beans (*Phaseolus vulgaris*) when cut fresh, none or faintly fragrant when dried. Taste not noted. Hyphae without clamps.

Habitat.—In pine woods on acid sandy soil.

Distribution.—In the central and north-eastern parts of the country, probably rare.

Illustrative collections.—Drente: Diever, Berkenheuvel, 6 X 1954, *Maas G. 10162* (L); Gelderland: Apeldoorn, IX 1890, *C. A. J. A. Oudemans* (L).

Exsiccati.—Fuckel, Enum. Fung. Nassov., ser. 1: 951 (*Hydnum*; L); Fuckel, Fungi rhen. 1351 (*Hydnum*; K); Kryptog. exs. vindob. 2015 (*Hydnum*; C, K, L, PR); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 70, 2210 (*Hydnum*; C, PR); Petrak, Fl. Bohem. Morav., ser. 2(1): 2336 (*Hydnum*; PR); Rabenhorst, Fungi europ. 1507 (*Hydnum*; L); Rabenhorst, Herb. mycol., ed. 2: 415 (*Hydnum*; L); Saccardo, Mycoth. ital. 216 (*Hydnum*; L, PR); von Thümen, Fungi austr. 319 (*Hydnum*; PR).

Hydnellum aurantiacum, easily recognisable in Europe, belongs to a group which in the United States appears to have caused confusion. What Coker & Beers described under this name is not *H. aurantiacum*, but the related species *Hydnellum earlianum* Banker which they cited as a synonym. True *H. aurantiacum* does occur in Canada, from which country I received two collections: Nova Scotia, Cumberland County, Parrsboro, 18 VIII 1956, *K. A. Harrison 3328* (L), and Nova Scotia, Kings County, Aylesford Lake, 21 IX 1956, *K. A. Harrison 3321* (L). Whether the distributional area of this species extends much farther south I am unable to say. Obviously, however, *H.*

aurantiacum is unknown from North Carolina, for all of the collections I received on loan from Herb. Coker (Nos. *1241, 1244, 1847, 14008*; NCU) represent one and the same species: *Hydnellum earlianum.*

Snell, Dick, Jackson & Taussig in discussing the difference between *Hydnellum aurantiacum* and *H. ferrugipes* (1956: 168, as *Calodon*), also mistook *H. earlianum* for *H. aurantiacum*, whereas I suspect their *H. ferrugipes* to be the true *H. aurantiacum.*

Genuine *H. ferrugipes* was received on loan through the courtesy of Miss E. K. Goldie-Smith (Nos. *3201, 3211, 4517, 4530*; NCU), which enabled me to give the following survey based on the dried material. *Hydnellum ferrugipes* stands out at once on account of the context of the pileus which in the firmer parts shows patches of slate blue or is almost entirely of that colour. In addition, the tomentum which seems to be whitish when young turns pale buff (café-au-lait) at a later stage. Both the slate blue and buff do not occur in *H. aurantiacum* and *H. earlianum.*

Hydnellum aurantiacum is characterised by the colour of the context which is orange in the stipe, pallid or dingy yellowish in the greater part of the pileus. The tomentum of the pileus which is whitish when very young turns into a delicate orange at a later stage, becoming dark brown when old. The spines are whitish to pallid when immature.

In *Hydnellum earlianum* the context of both pileus and stipe is of a uniform brilliant reddish orange. The tomentum of the pileus passes from an original whitish colour through salmon and brick red to dark brown. The spines, as pointed out by Snell et al., have a decidedly "sulphur cast" when immature, which is well retained even when dried.

Probably, the confusion of *H. aurantiacum* and *H. earlianum* among American authors is to some extent due to the misleading plate given by Bresadola. It is certainly not true that in *H. aurantiacum* the context of the pileus is as brightly orange as in the stipe. Walty's plate is scarcely better, whereas the only figures I consider to be perfectly reliable in this respect are those of Konrad & Maublanc.

Since Banker was the first author to typify *Hydnum floriforme* Schaeff., his view of the species as having orange flesh is being followed here. It should be noticed, however, that in my opinion only fig. 4 of Schaeffer's plate can be recognised as the present species. Figures 1–3 and 5–6 represent *Hydnellum compactum*, whereas fig. 7 might even be good of *Hydnellum ferrugineum.*

HYDNELLUM CAERULEUM (Hornem. ex Pers.) P. Karst.

Hydnum caeruleum Hornem. *in* Fl. dan. **8** (Fasc. 23): 7. 1808; *ex* Pers., Mycol. europ. **2**: 162. 1825. — *Hydnum suaveolens* β *H. caeruleum* Hornem. ex Fr., Syst. mycol. **1**: 402. 1821. — *Calodon caeruleus* (Hornem. ex Pers.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 106. 1882; Quél. *in* Assoc. franç. Avanc. Sci. 13. 1882. — *Hydnellum caeruleum* (Hornem. ex Pers.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1880. — Type: represented by Hornem. *in* Fl. dan. **8** (Fasc. 23): pl. 1374. 1808.

Hydnum cyaneotinctum Peck *in* Bull. Torrey bot. Cl. **30**: 98. 1903. — *Hydnellum cyaneotinctum* (Peck) Banker *in* Mem. Torrey bot. Cl. **12**: 164. 1906. — *Calodon cyaneotinctum* (Peck) Snell *in* Mycologia **37**: 51. 1945. — Type: lacking acc. to Coker & Beers, Stip. Hydn. east. U.S. 64. 1951. — Type locality: U.S.A., Maine, Orris Island.

Misapplied names.—*Hydnum compactum sensu* Fr., Syst. mycol. **1**: 402. 1821. — *Calodon compactus sensu* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 107. 1882.—*Phaeodon compactus sensu* J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3**(1): 459. 1888 (pro parte). — *Hydnellum compactum sensu* Nikol. *in* Pl. cryptog. **9**: 471. 1954; not *Hydnum compactum* Pers. = *Hydnellum compactum*.

Hydnum floriforme sensu Secr., Mycogr. suisse **2**: 512. 1833; not *Hydnum floriforme* Schaeff. = *Hydnellum aurantiacum*.

Descriptions.—Bourdot & Galzin, Hym. France 457. 1928 (*Calodon*); Bresadola, Icon. mycol. **22**: text to pl. 1051. 1932 (*Hydnum*); Coker & Beers, Stip. Hydn. east. U.S. 63. 1951 (*Hydnellum cyaneotinctum*); Donk *in* Med. Nederl. mycol. Ver. **22**: 52. 1933; Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 473. 1926 (*Calodon*).

Illustrations.—Bresadola, Icon. mycol. **22**: pl. 1051. 1932 (*Hydnum*; passable); Coker & Beers, Stip. Hydn. east. U.S. pl. 38. 1951 (*Hydnellum cyaneotinctum*; photogr.); Fl. batava **23**: pl. 1835. 1911 (*Hydnum compactum*; passable); Hornemann *in* Fl. dan. **8** (Fasc. 23): pl. 1374. 1808 (*Hydnum*; recognisable); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 473. 1926 (*Calodon*; colours too harsh); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **1**: pl. 5, fig. 11. 1831 (*Hydnum violascens*; uncertain) & **7**: pl. 50, fig. 13–14. 1841 (*Hydnum cinereum*; recognisable); Sturm, Deutschl. Fl., Abt. 3, Pilze Deutschl. **33**: pl. 7. 1853 (*Hydnum compactum*; mediocre); Walty, Schweiz. Pilztaf. **3**: pl. 62. 1947 (*Calodon*; mediocre).

Diagnostic characters.—Carpophores solitary or concrescent. Pileus convex to plane, becoming depressed, smooth to uneven or colliculose, more or less radially wrinkled with age, covered with soft velvety tomentum which collapses to fairly smooth surface or becomes roughly pitted in centre, azonate, delicately blue or violet when very young, soon turning white, then from centre outwards yellowish brown to fulvous or dark brown. Stipe slender to stocky, ventricose or with bulbous base from thick spongiose covering, surface velvety becoming matted, from whitish soon turning yellowish brown, sometimes with slight tinge of orange, to dark brown. Spines more or less decurrent, from pale violet turning chocolate brown. Context in pileus not always distinctly duplex, pale buff, zoned with numerous bluish and a few fuscous lines in the harder parts, with the blue zones at times less distinct or absent in the softer parts, clearly duplex and orange-brown in stipe, blue parts becoming bluish green in KOH, orange parts olive brown. Odour when cut of French beans or cucumber. Taste indistinctive or somewhat of cucumber. Hyphae with occasional clamp connections.

Habitat.—On acid sandy soil in pine woods.

Distribution.—In central and north-eastern parts of the country, uncommon.

Illustrative collections.—Drente: Dwingelo, Schurenberg, 9 IX 1955, *W. Beyerinck* (L); Utrecht: Soest, Pijnenburg, 3 VIII 1956, *G. A. de Vries* (L).

Exsiccati.—Brinkmann, Westfäl. Pilze, Lief. 2: 99 (*Hydnum*; K, L); Fl. exs. Austro-Hung. 3150 (2) (*Hydnum suaveolens*; C, L, PR); Karsten, Fungi fenn. exs. 909 (*Hydnum*; K); Klotzsch, Herb. viv. mycol. 128 (*Hydnum compactum*; L); Klotzsch, Herb. mycol., ed. nova: 114 (*Hydnum cinereum*; K); Kryptog. exs. vindob. 2208 (*Hydnum*; C, K, L, PR); 2614 (*Hydnum cyathiforme*; PR); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 347 (*Hydnum*; C, PC, PR); Oudemans, Fungi neerl. exs. 233 (*Hydnum compactum*; K); Pilát, Fungi carpat. exs. 137 (*Calodon*; K); Rabenhorst, Fungi

europ. 711 (*Hydnum cinereum*; K, L); Roumeguère, Fungi gall. exs. 2305 (*Hydnum compactum*; BR, K, L in part); Saccardo, Mycoth. ital. 811 (*Hydnum nigrum* **H. melilotinum*; L in part); von Thümen, Fungi austr. 318 (*Hydnum ferrugineum*; PR).

With regard to the confusion with *Hydnellum compactum*, I may refer to the discussion under that species.

Coker & Beers listed *Hydnellum inquinatum* Banker as a synonym of *H. cyaneotinctum*, but that needs confirmation. Banker (1913: 202) in describing the flesh, made no mention of bluish zones, whereas it is hard to believe that the conspicuous orange-brown colour of the context in the stipe would have escaped his attention.

In Herb. Donk there is a collection from the type locality and sent by Banker (*Hydnellum inquinatum* Banker. North Bolton, N.Y., 11 IX 1922, on hemlock roots in bed of brook, No. *3853*), but the material does not agree with the original description either, since the context is decidedly purplish brown, and the hyphae lack clamp connections, which suggests that the specimens belong to the group of *H. velutinum*. As long as I have not seen the type, I am unable to explain the discrepancy.

HYDNELLUM COMPACTUM (Pers. ex Fr.) P. Karst.

Hydnum compactum Pers., Comment. Schaeff. 57. 1800; *ex* Fr., Syst. mycol. **1**: 402. 1821 (misapplied, = *Hydnellum caeruleum*); not *Hydnum compactum sensu* Inzenga, Funghi Sicil. **1**: ?. 1869 (non vidi) = sterile form of *Polyporus biennis*, according to Bresadola, Icon. mycol. **20**: text to pl. 957. 1931; not *Calodon compactus sensu* P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 107. 1882, nor *sensu* Quél., Ench. Fung. 190. 1886 = *Hydnellum caeruleum*; not *Phaeodon compactus sensu* J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 459. 1888 - *Hydnellum caeruleum*, pro parte. — *Hydnellum compactum* (Pers. ex Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879; not *Hydnellum compactum sensu* Nikol. *in* Pl. cryptog. **9**: 471. 1954 = *Hydnellum caeruleum*.—Type: *Hydnum compactum* P. (L 910.262–28, here chosen as lectotype).

Hydnum acre Quél. *in* Bull. Soc. bot. France **24**: 324. 1877.—*Sarcodon acre* (Quél.) Quél., Ench. Fung. 188. 1886.—*Hydnellum acre* (Quél.) Donk *in* Med. Nederl. mycol. Ver. **22**: 54. 1933.—Type: (in absence of material, information Prof. A. Maublanc) represented by Quél. *in* Bull. Soc. bot. France **24**: pl. 6, fig. 1. 1877.

DESCRIPTIONS.—Bourdot & Galzin, Hym. France 451. 1928 (*Sarcodon acre*); Donk *in* Med. Nederl. mycol. Ver. **22**: 54. 1933 (*Hydnellum acre*).

ILLUSTRATIONS.—Bresadola, Icon. mycol. **21**: pl. 1041. 1932 (*Hydnum acre*; mediocre); Fl. batava **26**: pl. 2047. 1924 (*Hydnum acre*; very good); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 50, fig. 12. 1841 (*Hydnum*; passable); Quélet *in* Bull. Soc. bot. France **24**: pl. 6, fig. 1. 1877 (*Hydnum acre*; passable); Schaeffer, Fung. Icon. **2**: 146. fig. 1–3, 5–6. 1763 (*Hydnum floriforme*; juvenile, fleshcolour too pronounced, otherwise good).

DIAGNOSTIC CHARACTERS.—Carpophores solitary or concrescent. Pileus planoconvex to depressed, at first smooth or uneven to somewhat colliculose, at times somewhat concentrically wrinkled with age, surface velutinous to strigose-woolly, becoming pitted or matted from collapse of tomentum, neither radially striate or ridged nor concentrically zoned, under wet conditions sometimes developing fertile spines, white when young, then dingy ochraceous, turning darker with age, with bistre or olivaceous tints. Stipe stocky, tapering downwards or equal, velutinous to felted or glabrescent, concolorous with cap or darker, rarely with mosses or vegetable debris adhering to it,

usually clean. Spines decurrent, finally greyish brown. Context very thick, almost fleshy, shrinking on drying, turning more or less rigid in stipe, zonate in pileus, not clearly duplex, imperceptibly passing into tomentum of surface, pallid to dingy yellowish throughout or more brownish towards base of stipe, no colour reaction with KOH. Odour when cut of water-melon, cucumber, or French beans. Taste instantly acrid, later on bitter and astringent. Hyphae without clamp connections.

Habitat.—In frondose woods, also stated to occur under pines (Krombholz, Quélet), on acid, humous, frequently naked soil.

Distribution.—In the central and eastern parts of the country, uncommon.

Illustrative collections.—Gelderland: Ede, 4 IX 1955, *Maas G. 10653* (L); Hierden, Hulshorst, 23 IX 1955, *Maas G. 10705* (L).

Authentic collections.—*Hydnum compactum* (L 910.262–592); *Hydnum compactum*. Prope Parisios (L 910.262–595).

Exsiccati.—Jaap, Fungi sel. exs. 664 (*Hydnum cinereum*; K, L; useless material).

Fries in his "Systema" (and, as a matter of fact, also before and after) misapplied the name *Hydnum compactum* to a species that from the words "intus fusco & coeruleo-variegato" can be unmistakably identified as *Hydnellum caeruleum*. The latter also figures in the "Systema", viz. as *Hydnum suaveolens* β *H. coeruleum*, but Fries never came to know its identity. As Fries also adopted from Persoon Schaeffer's plate, or at least some of its figures, as being typical of his *H. compactum*, the belief was generally held that these figures stand for a species with blue-zoned flesh. However, the fact that (1) the stipes have been drawn so obviously clean of adhering matter, and (2) the tomentum of the cap lacks any trace of blue tints, rather indicates that the figures represent young stages of Persoon's *Hydnum compactum*. It should be pointed out that the colour of the flesh in fig. 7 is neither correct for *H. caeruleum*, nor for *H. compactum*, nor for *H. aurantiacum* which is represented in fig. 4. In this connection I would like to draw the attention to *Hydnum pulvinatum* Secr. (Mycogr. suisse 2: 513. 1833) which in its description appears to combine all the discordant characters as shown in Schaeffer's plate 146 – although Secretan made no reference to that plate –, and for that reason remains unidentifiable.

As it seems, only Krombholz (1841: 12) interpreted Persoon's species correctly, his description of the taste as "sehr scharf und brennend" leaving no doubt.

Even in recent times *H. compactum* is by some authors thought to be a species of which the context is zoned with bluish lines. Coker & Beers consider it the "nearest relative in Europe of the American *cyaneotinctum*."

Banker's (1913: 201) identification of Persoon's specimens as a form of *H. suaveolens* is quite incomprehensible.

On a collection of *Hydnellum mirabile* (Fr.) P. Karst., received on loan from Stockholm, Lundell commented: "*H. acre* Quél. is, in my eyes, identical with *H. mirabile* Fr." I examined the collection anatomically, but failed to find any difference from the present species. Yet, I perfectly agree with Donk (l.c. 54) that (1) the surface of the pileus is much more strigose in *H.*

mirabile than in *H. compactum*; (2) the duplex structure of the context in the cap is more pronounced in the former than in the latter, the difference being obvious even in the dried material; (3) whereas the taste is said to be weakly acrid and bitter in the former, it is very strongly so in the latter. The best course for the time being seems to treat both as specifically different.

HYDNELLUM DIABOLUS Banker

Hydnellum diabolus Banker *in* Mycologia **5**: 194. 1913.—*Calodon diabolus* (Banker) Snell *in* Lloydia **19**: 166. 1956.—*Hydnum diabolus* (Banker) A. H. Smith, Mushrooms nat. Habitats 227. 1949 (non vidi). — Type: *Hydnellum diabolus*, Maine, Mt. Desert, *Miss V. S. White* (NY).

MISAPPLIED NAME.—*Hydnellum carbunculus sensu* Banker *in* Mem. Torrey bot. Cl. **12**: 151. 1906; not *Hydnum carbunculus* Secr., Mycogr. suisse **2**: 515. 1833 = *Hydnellum ferrugineum*.

DESCRIPTIONS.—Banker *in* Mycologia **5**: 194. 1913; Coker & Beers, Stip. Hydn. east. U.S. 71. 1951.

ILLUSTRATIONS.—Coker *in* J. Mitchell sci. Soc. **34**: pl. 14, 15. 1919 (photogr.; pl. 15 excellent); Coker & Beers, Stip. Hydn. east. U.S. pl. 44 (top). 1951 (photogr.); Snell, Dick & Jackson *in* Lloydia **19**: fig. 2. 1956 (*Calodon*; photogr.).

DIAGNOSTIC CHARACTERS.—Carpophores solitary or confluent. Pileus convex to plane, becoming depressed or umbilicate, smooth or colliculose when young, becoming radially wrinkled or ridged when old, at first covered with very fine white tomentum, when damp exuding red droplets which leave red-brown to blackish stains, tomentum from centre outwards turning yellowish brown, cinnamon, or pale to very dark purplish brown, becoming matted, eventually collapsing to firm, somewhat shiny surface, very rarely showing dots of excreted matter, margin finally glabrescent. Stipe stocky, equal or subbulbous below, or ventricose, increasingly spongiose downwards, glabrescent with age, concolorous with pileus or darker. Spines decurrent, pinkish brown, turning chocolate brown. Context zonate, not clearly duplex, soft-corky, harder towards spines, woody in stipe, marked by dots of excreted matter when dried, pale yellowish brown to pale pinkish brown in cap, darker towards stipe, not discolouring in KOH or becoming somewhat olivaceous, pockets of excreted matter staining red-brown. Odour pleasant (see remarks), taste very acrid, even when dried, becoming bitter after mastication of dried material. Hyphae with clamp connections.

HABITAT.—In coniferous woods.

DISTRIBUTION.—In the central and eastern parts of the country, uncommon.

ILLUSTRATIVE COLLECTIONS.—Drente: Dwingelo, Lheeder Zand, IX 1952, *H. S. C. Huijsman* (L); 15 VIII 1954, *Maas G. 10072* (L); Gelderland: Nunspeet, "Hoogwolde", 3 X 1953, *H. Kleijn* (L).

EXSICCATI.—Desmazières, Pl. crypt. France, ser. 1: 2159 (*Hydnum ferrugineum*; K); Ellis, North Am. Fungi 928 (*Hydnum ferrugineum*; L, NY); Rabenhorst, Fungi europ. 803 (*Hydnum compactum*; K. L); Sydow, Mycoth. germ. 1306 (*Hydnum ferrugineum*; C, L, PR); Sydow, Mycoth. march. 811 (*Hydnum aurantiacum*; K).

As Secretan only intended to publish a new name to replace Fries's *Hydnum ferrugineum*, there is no reason at all to regard *H. carbunculus* as synonymous with *H. diabolus*. Banker (1906: 151–152) when looking among European literature for a description that matched his material of *H. diabolus*, chose *H.*

carbunculus since he found his plants to "correspond to Secretan's description in nearly all characters." There is, however, not a single character in Secretan's description that does not apply equally well to *H. ferrugineum*. I would even be inclined to think that the description of the flesh as having a "teinte ferrugineuse très-claire et luisante" fits *H. ferrugineum* rather better than *H. diabolus*, but to me it seems impossible to prove irrefutably the identity of Secretan's *H. carbunculus*. This fact in itself would suffice to reject *H. carbunculus* as an ambiguous name, were one compelled to choose between this name and *H. diabolus*.

Banker (1913: 196) doubted whether Secretan could have described the American species, since among others "the American form does not appear to be represented in Europe..." From several finds it now appears that *H. diabolus* is widely distributed on this continent, although perhaps it is not everywhere of common occurrence. I saw rich and beautiful material from several localities in Czechoslovakia (PR) identified by Z. Pouzar. The adjoining countries Austria (Tyrol) and Germany (Brandenburg) are represented by the exsiccati of Sydow and Rabenhorst mentioned above. From France material was distributed by Desmazières in his exsiccati series (K). In Belgium the species was collected twice: Lichtaart, 1 IX 1941, *M. Beeli 1967* (BR), and Westmalle, Campine anversoise, IX 1882, *M. Rousseau* (BR). The examples enumerated above under "Illustrative collections" show the species to occur also in the Netherlands. From Denmark I have seen the following collection: Jutland, Gludsted Plantage, 13 X 1951, *A. Hjorth Nielsen* (C), whereas Dr Lundell kindly gave me a small juvenile Swedish specimen: Dalarne, Rättvik parish, Nittsjö, 1 IX 1953, *Märta Tengstrand* (L). Several more collections of the present species from Jämtland, Småland, and Upland are in Herb. Romell (S). Great Britain is represented by several finds from Scotland: Aviemore, 29 & 31 VIII 1953, *D. A. Reid* (K); Forres, Herb. Berk. (K); Glen Affric, 15 IX 1956, *Peter Orton* (K, L); Rothiemurchus, 1 X 1907, *Dr Moreland* (K); locality not specified, brought to the Hereford Show, 1879 (K). Finally, the species is reported by Nikolajeva (1954: 475) from various parts of the U.S.S.R.

The occurrence of *H. diabolus* in Sweden may raise the question whether Fries may have based the description of his *H. ferrugineum* on the present species. However, considering the fact that Fries described the flesh as ferruginous, it can safely be assumed that his *H. ferrugineum* really was as we now understand that species.

The odour of the present species was described by Banker as "of hickory nuts" – unfortunately unknown to me –, whereas Coker & Beers added the words "medicinal... not unpleasant." Nikolajeva (1954: 475) described it as agreeable, but not strong. My own notes on the living material lack information on the odour. The most detailed description comes from D. A. Reid who sent me part of the specimen from Glen Affric: "When fresh the specimen had a quite strong sweetish-spicy smell, but cut surfaces had a strong odour of meal."

HYDNELLUM FERRUGINEUM (Fr. ex Fr.) P. Karst.

Hydnum ferrugineum Fr., Obs. mycol. **1**: 133. 1815; *ex* Fr., Syst. mycol. **1**: 403. 1821; not *Hydnum ferrugineum* Pers., Syn. Fung. **2**: 562. 1801 = *Caldesiella ferruginosa* (Fr.) Sacc. — *Hydnellum ferrugineum* (Fr. ex Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879. — *Calodon ferrugineus* (Fr. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 16. 1881. — *Phaeodon ferrugineus* (Fr. ex Fr.) J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 459. 1888. — *Hydnum floriforme* var. *ferrugineum* (Fr. ex Fr.) Cost. & Dufour, Nouv. Fl. Champ. 161. 1891. — *Hydnum carbunculus* Secr., Mycogr. suisse **2**: 515. 1833 (avowed name change); not *Hydnellum carbunculus sensu* Banker *in* Mem. Torrey bot. Cl. **12**: 151. 1906 *Hydnellum diabolus*. — *Hydnellum sanguinarium* Banker *in* Mem. Torrey bot. Cl. **12**: 152. 1906 (avowed name change); not *Hydnellum sanguinarium sensu* Coker *in* J. Mitchell sci. Soc. **41**: 284. 1926 = *Hydnellum velutinum* var. *spongiosipes*. — Type: non-existing, cf. Banker *in* Mycologia **5**: 197. 1913. — Type locality: Sweden.

Hydnum hybridum Bull., Hist. Champ. France 307. 1791, pro parte; *ex* Mérat, Nouv. Fl. Env. Paris, Deux. Ed., **1**: 38. 1821; not *Hydnum hybridum* Secr., Mycogr. suisse **2**: 514. 1833 = *Hydnellum velutinum* var. *scrobiculatum*. — *Hydnellum hybridum* (Bull. ex Mérat) Banker *in* Mycologia **5**: 198. 1913 (misapplied, = *Hydnellum velutinum* var. *scrobiculatum*). — Type: (in absence of material, cf. Banker l.c.) represented by Bulliard, Herb. France pl. 453, fig. 2. 1789 (except the larger specimen in fig. 2 G).

MISAPPLIED NAMES.—*Hydnum compactum* var. β? *striatum sensu* Pers., Mycol. europ. **2**: 166. 1825; not *Hydnum striatum* Schaeff., Fung. Icon. **4**: 98. 1774 = unrecognisable.

Calodon floriforme sensu Quél., Ench. Fung. 190. 1886; not *Hydnum floriforme* Schaeff., Fung. Icon. **4**: 97. 1774 = *Hydnellum aurantiacum*.

DESCRIPTIONS.—Fries, Icon. sel. Hym. **1**: 6. 1867 (*Hydnum*); Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 474. 1926 (*Calodon*).

ILLUSTRATIONS.—Bresadola, Icon. mycol. **22**: pl. 1053. 1932 (*Hydnum*; fig. on right side only, unusually slender, perhaps even *H. velutinum* var. *scrobiculatum*); Bulliard, Herb. France pl. 453, fig. 2 (except the larger specimen in fig. 2 G). 1789 (*Hydnum hybridum*; perhaps too much infundibuliform); Gillet, Champ. France pl. 319. 1878–1890 (*Hydnum*; passable); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 474. 1926 (*Calodon*; good); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 50, fig. 10–11. 1841 (*Hydnum*; fairly good); Maublanc, Champ. France, Quatr. éd., **2**: pl. 196, fig. 1. 1952 (*Calodon*; good); Michael-Schulz, Führer Pilzfr. 3: pl. 306. 1927 (*Hydnum*; good); Nikolajeva *in* Pl. cryptog. **9**: fig. 5. 1954 (good).

DIAGNOSTIC CHARACTERS.—Carpophores solitary or connate. Pileus obconical or convex, becoming plane to depressed, smooth at first, becoming more or less knobby in centre with age, never radially crested nor lamellate, covered with white soft tomentum when young, when damp exuding red droplets which disappear at an early stage, tomentum from centre outwards turning pale pinkish brown to yellowish brown, becoming finely pitted, with age or after handling collapsing, and turning into a hard, ferruginous to dark brown, somewhat shining, azonate surface, without dots of excreted matter when dry, margin long remaining tomentose. Stipe stocky, equal or subbulbous below, tomentose, glabrescent with age, ferruginous. Spines decurrent, pinkish brown, finally chocolate brown. Context zonate, duplex, corky, harder towards spines and with hard woody core in stipe, marked by numerous dots of excreted matter when dried, rufous brown to purplish brown, darker in stipe, staining dark violet in KOH but turning olive green to blackish olive immediately afterwards. Odour stated to be agreeable, taste indistinctive. Hyphae without clamps.

HABITAT.—In coniferous and deciduous woods.

DISTRIBUTION.—In central and eastern parts of the country, but not collected in recent times.

ILLUSTRATIVE COLLECTIONS.—Groningen: Ter Apel, VIII 1910, *J. A. Tresling* (L; uncertain); Gelderland: Ede, VIII 1916 and VIII 1917, *J. L. F. de Meijere* (L).

EXSICCATI.—Fuckel, Enum. Fung. Nassov., ser. 1: 950 (*Hydnum*; L); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal., Fasc. 7–8: 348 (*Hydnum*; C, PR), Fasc. 45–46: 2207 (*Hydnum;* C, PR, S).

For the time being I regard *Hydnellum ferrugineum* as a separate species, mainly, I admit, because I do not know it sufficiently well. I have seen dried material only, mostly from Sweden, and do not know how the fruit-bodies develop in older stages. My conception of the species is based on the original description as well as on a number of specimens identified by Lundell. Taking these as a guide I am inclined to think that the descriptions of *H. ferrugineum* as given by Bourdot & Galzin, Coker & Beers, and Donk are incorrect in that they also include characteristics of *H. velutinum* var. *scrobiculatum*. I would not be surprised, however, to find that, with far more material from a wider area at hand, there do exist intermediate stages between *H. ferrugineum* and *H. velutinum*, more especially *var. spongiosipes*.

HYDNELLUM VELUTINUM (Fr.) P. Karst.

Hydnum velutinum Fr., Syst. mycol. **1**: 404. 1821; Epicr. Syst. mycol. 508. 1836–1838; Hym. europ. 604. 1874.—*Hydnellum velutinum* (Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879; not *Hydnellum velutinum sensu* Banker *in* Mem. Torrey bot. Cl. **12**: 153. 1906 = *Hydnellum velutinum* var. *spongiosipes*.—*Calodon velutinus* (Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 109. 1882; Quél., Ench. Fung. 190. 1886; not Quél., Fl. mycol. France 443. 1888 = *Hydnellum velutinum* var. *spongiosipes*.—Type: non-existing, cf. Banker *in* Mycologia **5**: 196. 1913.—Type locality: Sweden, (most probably) Småland, "In pinetis ..." (Lindblad, Syn. Fung. Hydn. Suec. nasc. 10. 1853).

Hydnum suberosum varietas α. *spongiosa* Batsch, El. Fung. Cont. 2: 99. 1789.—Type: represented by Batsch, El. Fung. Cont. 2: pl. 40, fig. 221. 1789.

Hydnum cyathiforme a. Fr., Syst. mycol. **1**: 405. 1821; not *Hydnum cyathiforme* Schaeff., Fung. Icon. **4**: 93. 1774; *ex* St.-Amans, Fl. agén. [illegible] Apr. 1821 ("Bull.", misapplied); not *Hydnellum cyathiforme* (Schaeff. ex St.-Amans) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879 = *Phellodon tomentosus*.—Type: represented by Bulliard, Herb. France pl. 156. 1783 ("*Hydnum cyathiforme* Schaeff.").

Hydnum concrescens Pers., Obs. mycol. **1**: 74. 1796; Syn. Fung. **2**: 556. 1801; *ex* Pers., Mycol. europ. **2**: 164. 1825.—*Hydnellum concrescens* (Pers. ex Pers.) Banker *in* Mem. Torrey bot. Cl. **12**: 157. 1906.—Type: *Hydnum concrescens* Syn. fun. *Hydnum Cyathiforme* (L 910. 262–598, here chosen as lectotype).

Hydnum scrobiculatum Fr., Obs. mycol. **1**: 143. 1815; *ex* Secr., Mycogr. suisse **2**: 522. 1833.—*Hydnellum scrobiculatum* (Fr. ex Secr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879.—*Calodon scrobiculatus* (Fr. ex Secr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 108. 1882.—*Calodon zonatum* var. *scrobiculatum* (Fr. ex Secr.) Quél. Ench. Fung. 190. 1886.—Type: non-existing, cf. Banker *in* Mycologia **5**: 196. 1913.—Type locality: Sweden, Småland, Femsjö (Lindblad, Syn. Fung. Hydn. Suec. nasc. 10. 1853).

Hydnum zonatum Fr., Epicr. Syst. mycol. 509. 1838 (*Hydnum cyathiforme* b. Fr., Syst. mycol. **1**: 405. 1821); non *Hydnum zonatum* Batsch, El. Fung. 111. 1783 = *Phellodon tomentosus*.—*Hydnellum zonatum* (Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879.—*Calodon zonatus* (Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 108. 1882.—*Phaeodon zonatus* (Fr.) J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 458. 1888.—Type: represented by Batsch, El. Fung. Cont. 2: pl. 40, fig. 224. 1789.

Hydnum vespertilio Berk. *in* J. Bot. Kew Gard. Misc. **6**: 167. 1854.—*Hydnellum vespertilio* (Berk.) Banker *in* Mycologia **5**: 198. 1913.—*Hydnellum zonatum* f. *vespertilio* (Berk.) Coker & Beers, Stip. Hydn. east. U.S. 80. 1951.—Type: *Hydnum vespertilio* Berk. Nunklow July 10. 1850 (K).

Hydnum queletii Fr. *apud* Quél. *in* Mém. Soc. Émul. Montbéliard, ser. 2, **5**: 277. 1872; Fr.,

Hym. europ. 605. 1874. — *Hydnellum queletii* (Fr. apud Quél.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879 ("*Queleletii*"). — *Calodon zonatum* var. *queletii* (Fr. apud Quél.) Quél., Ench. Fung. 191. 1886. — *Hydnum zonatum* var. *queletii* (Fr. apud Quél.) Cost. & Dufour, Nouv. Fl. Champ. 160. 1891. — Type: *Hydnum queletii* Fr. Jura *Quélet* (UPS).

Hydnum spongiosipes Peck *in* Ann. Rep. N.Y. State Mus. **50**: 111. 1897. — Type: *Hydnum spongiosipes*, Peck, Round Lake, Saratoga County, August, *Charles H. Peck* (NYS; here chosen as lectotype); Sandlake, Rensselaer County, July, *Charles H. Peck* (NYS; syntype).

DIAGNOSTIC CHARACTERS.—Carpophores often confluent. Pileus convex, plane, depressed, or infundibuliform, surface tomentose or velutinous, long remaining unchanged, or glabrescent in places, or from centre outwards becoming matted or pitted, or lamellate in centre and radially ridged or fibrillose towards margin, azonate or concentrically zoned, in some cases also concentrically dotted with whitish granular excretions when dried, at times somewhat shiny, from whitish turning pinkish brown, then dull yellow-brown, or fulvous, sometimes with purplish hue, usually cinnamon brown in variety *spongiosipes*, concentrical zones often darker, margin finally concolorous. Stipe single, or two to three joined at base, or several springing from common base, sometimes radicating, in some cases covered with thick spongiose felt, surface tomentose, glabrescent or becoming matted. Spines decurrent, from pinkish brown turning chocolate brown. Harder part of context zonate, especially in stipe, marked by dots of excreted material when dried, purplish brown throughout, staining dark violet in KOH but turning olive green immediately afterwards. Odour and taste indistinctive, or odour when cut of cucumber, taste farinose. Hyphae without clamps.

Var. VELUTINUM

Hydnum velutinum Fr. l.c.

DESCRIPTIONS.—Fries, Syst. mycol. **1**: 404. 1821; Epicr. Syst. mycol. 508. 1836–1838; Hym. europ. 604. 1874 (*Hydnum*).

ILLUSTRATIONS.—None.

DIAGNOSTIC CHARACTERS.—Pileus plane to depressed or umbilicate-infundibuliform, smooth or uneven, covered with thick spongiose felt, surface velvety, on collapse becoming matted or pitted, rarely with dots of excreted matter when dried. Margin (not always) becoming radially striate or finely ridged, and obscurely zonate. Stipe slender to stocky, ventricose or with bulbous base from thick spongiose covering, surface plushy, becoming matted. Context duplex both in cap and stipe, softer parts much thicker than harder parts.

HABITAT.—In mixed and coniferous woods.

DISTRIBUTION.—In central and eastern parts of the country, not rare.

ILLUSTRATIVE COLLECTIONS.—Overijsel: Denekamp, Borgbos, 1 X 1950, *Maas G. 7505* (L); Gelderland: Putten, Sprielder bos, Solse Gat, 1 X 1950, *R. D. Hoogland 2590* (L).

EXSICCATI.—Brinkmann, Westfäl. Pilze, Lief. 2: 94 (*Hydnum*; K).

Var. **spongiosipes** (Peck) Maas G., *comb. nov.*

Hydnum spongiosipes Peck l.c. (basinym).

MISAPPLIED NAMES.—*Hydnellum velutinum sensu* Banker *in* Mem. Torrey bot. Cl. **12**: 153. 1906. — *Calodon velutinum sensu* Quél., Fl. mycol. France 443. 1888. — *Hydnellum sanguinarium sensu* Coker *in* J. Mitchell sci. Soc. **41**: 284. 1926; not *Hydnellum sanguinarium* Banker = *Hydnellum ferrugineum*.

DESCRIPTIONS.—Banker *in* Mem. Torrey bot. Cl. **12**: 153. 1906 (*Hydnellum velutinum*); Bourdot & Galzin, Hym. France 459. 1928 (*Calodon velutinum*);

Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 471. 1929 (*Calodon velutinum*); Peck *in* Ann. Rep. N.Y. State Mus. **50**: 111. 1897 (*Hydnum*).

Illustrations.—Bresadola, Icon. mycol. **22**: pl. 1054. 1932 (*Hydnum velutinum*; good); Coker *in* J. Mitchell sci. Soc. **34**: pl. 16. 1919 (*Hydnellum velutinum*; photogr., good) & **41**: pl. 58–60. 1926 (*Hydnellum sanguinarium*; photogr.); Coker & Beers, Stip. Hydn. east. U.S. pl. 45 (top and lower right; uncertain) & pl. 46 (good). 1951 (*Hydnellum velutinum*; photogr.); Fl. batava **24**: pl. 1890. 1915 (*Hydnum velutinum*; mediocre); Gillet, Champ. France pl. 324. 1878–1890 (*Hydnum velutinum*; habitus passable, colours bad); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 471. 1929 (*Calodon velutinum*; good except for colour); Patouillard, Tab. anal. Fung. **7**: fig. 677. 1889 (*Calodon velutinum*; good).

Diagnostic characters.—Pileus convex becoming somewhat depressed, or, equally often, depressed when very young becoming convex on expanding, and depressed again with age, smooth or uneven or colliculose with low broad swellings, sometimes with single concentrical marginal groove, and with radially wrinkled margin, azonate, covered with thick spongiose felt, surface velvety, remaining unchanged or glabrescent with age, releasing sap and collapsing to dark red-brown shiny crust when handled, sometimes also becoming pitted or even somewhat matted, and radially fibrillose at margin, usually cinnamon when mature, no dots of excreted matter visible when dried. Stipe slender to stocky, ventricose or with bulbous base, often constricted at top, surface plushy, becoming matted. Context duplex both in cap and stipe, softer parts much thicker than harder parts.

Habitat.—In deciduous and mixed woods, on humous sandy soil.

Distribution.—Fairly common in central and eastern parts of the country.

Illustrative collections.—Friesland: Beetsterzwaag, 14 IX 1954, *Mrs H. Kijlstra* (L); Gelderland: Wageningen Hoog, 24 VIII 1952, *Maas G. 8980* (L).

Exsiccati.—Brinkmann, Westfäl. Pilze, Lief. 2: 94 (*Hydnum velutinum*; L); Oudemans, Fungi neerl. exs. 112 (*Hydnum aurantiacum*; K); Roumeguère, Fungi gall. exs. 2307 (*Hydnum ferrugineum* f. *ferruginea*; BR, K, L).

Var. **scrobiculatum** (Fr. ex Secr.) Maas G., *comb. nov.*

Hydnum scrobiculatum Fr. l.c. (basinym).
Hydnum suberosum var. α *spongiosa* Batsch l.c.
Hydnum cyathiforme a. Fr. l.c.
Hydnum concrescens Pers. l.c.
Hydnum queletii Fr. apud Quél. l.c.

Descriptions.—Bourdot & Galzin, Hym. France 460, 461. 1928 (*Calodon scrobiculatum*, *C. zonatum* var. *queletii*); Donk *in* Med. Nederl. mycol. Ver. **22**: 57. 1933 (*Hydnellum scrobiculatum*); Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 475(2). 1932 (*Calodon scrobiculatum*).

Illustrations.—Batsch, El. Fung. Cont. 2: pl. 40, fig. 221. 1789 (*Hydnum suberosum* var. α *spongiosa*; bulbous base somewhat exaggerated); Bresadola, Icon. mycol. **22**: pl. 1053. 1932 (*Hydnum ferrugineum*; figs. on left side only, good); Bulliard, Herb. France pl. 150. 1783 (*Hydnum cyathiforme*; good) & pl. 453, fig. 2 G (the larger specimen only). 1789 (*Hydnum hybridum*; passa-

ble); Coker *in* J. Mitchell sci. Soc. **34**: pl. 18. 1919 (*Hydnellum zonatum*; photogr., intermediate form); Coker & Beers, Stip. Hydn. east. U.S. pl. 47 top and bottom left (*Hydnellum scrobiculatum*; photogr., bottom right fig. uncertain), 49 (*Hydnellum zonatum*; intermediate between var. *scrobiculatum* and var. *zonatum*; photogr.), 50 (*Hydnellum zonatum* f. *vespertilio*; photogr., intermediate form). 1951; Fl. batava **20**: pl. 1530. 1898 (*Hydnum ferrugineum*; poor); Fries, Icon. sel. Hym. **1**: pl. 5, fig. 1. 1867 (*Hydnum scrobiculatum*; passable); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 475 (2). 1932 (*Calodon scrobiculatum*; passable); Nannfeldt & Du Rietz, Vilda Växter i Norden, Andra revider. och komplett. upplagan, pl. 121. 1952 (*Hydnum ferrugineum*; recognisable); Pouzar *in* Česká Mykol. **10**: fig. 9–10. 1956 (*Hydnellum scrobiculatum*; photogr.).

DIAGNOSTIC CHARACTERS.—Pileus depressed to infundibuliform, pitted to lamellate in centre, sometimes with secondary pileoli, radially wrinkled or ridged or lamellate further outwards, concentrical zones few and not very marked, original tomentum becoming matted. Stipe usually stocky. Context fairly thick, corky and somewhat duplex in pileus, harder in stipe.

HABITAT.—Among grass or mosses in frondose and mixed woods on humous sandy soil.

DISTRIBUTION.—Common in central and eastern parts of the country, also in the dunal region.

ILLUSTRATIVE COLLECTION.—Utrecht: Baarn, 23 IX 1956, *Maas G. 11726* (L).

EXSICCATI.—Brinkmann, Westfäl. Pilze, Lief. 2: 93 (*Hydnum scrobiculatum*; K, L); Fuckel, Enum. Fung. Nassov., ser. 1: 949 (*Hydnum cyathiforme* Bull.; L); Fuckel, Fungi rhen. 1349 (*Hydnum scrobiculatum*; K); 1850 (*Hydnum ferrugineum*; K, uncertain); Klotzsch, Herb. viv. mycol. 124 (*Hydnum cyathiforme*; L not homogeneous, one packet containing var. *scrobiculatum*, the other var. *zonatum*) & 1715 (*Hydnum zonatum*; L, PR); Kryptog. exs. vindob. 2017 (*Hydnum scrobiculatum*; C, L approaching var. *zonatum*); Litschauer & Lohwag, Fungi sel. exs. Europ. 178 (*Hydnum scrobiculatum*; PR); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 2208 (*Hydnum scrobiculatum*; C, PR) & 2209 (*Hydnum scrobiculatum*; C, L, PR; somewhat intermediate between var. *scrobiculatum* and var. *zonatum*); Oudemans, Fungi neerl. exs. 111 (*Hydnum zonatum*; K, NBV; intermediate form); Rabenhorst, Fungi europ. 214 (*Hydnum scrobiculatum*; K, L; intermediate form) & 710 (*Hydnum ferrugineum*; K, intermediate between var. *scrobiculatum* and var. *zonatum*, L); Rabenhorst, Herb. mycol., ed. 2: 114 (*Hydnum ferrugineum*; L); Romell, Fungi exs. praes. scand. 19 (*Hydnum scrobiculatum*; C); Roumeguère, Fungi gall. exs. 2305 (*Hydnum compactum*; L in part) & 2308 (*Hydnum ferrugineum*; BR, K, L) & 3007 (*Hydnum scrobiculatum* f. pileo clavato; K, L; juvenile, uncertain); von Thümen, Fungi austr. 318 (*Hydnum ferrugineum*; K).

Var. **zonatum** (Fr.) Maas G., *comb. nov.*

Hydnum zonatum Fr. l.c. (basinym).
Hydnum vespertilio Berk. l.c.

DESCRIPTIONS.—Bourdot & Galzin, Hym. France 460. 1928 (*Calodon*);

Coker & Beers, Stip. Hydn. east. U.S. 79, 80, 1951 (*Hydnellum zonatum* and f. *vespertilio*); Donk *in* Med. Nederl. mycol. Ver. **22**: 58. 1933 (*Hydnellum*); Konrad & Maublanc, Icon. sel. Fung. **5**: text to pl. 475(1). 1932 (*Calodon*).

ILLUSTRATIONS.—Batsch, El. Fung. Cont. 2: pl. 40, fig. 224. 1789 (*Hydnum*; passable); Bresadola, Icon. mycol. 22: pl. 1056. 1932 (*Hydnum*; somewhat schematic); Coker *in* J. Mitchell sci. Soc. 34: pl. 1 (below, *Hydnellum*; passable), 17 (*Hydnellum*; photogr., good). 1919; Coker & Beers, Stip. Hydn. east. U.S. pl. 48 (*Hydnellum*; photogr., good), 51 (*Hydnellum zonatum* f. *vespertilio*; photogr.). 1951; Fl. batava **17**: pl. 1300. 1885 (*Hydnum*; poor); Gillet, Champ. France pl. 316, fig. 1. 1878–1890 (*Hydnum*; stipe and spines too pale); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 475(1). 1932 (*Calodon*; passable); Nikolajeva *in* Pl. cryptog. **9**: fig. 7. 1954 (*Hydnellum*; good); Rolland, Atl. Champ. France pl. 99, fig. 218. 1910 (*Hydnum*; fairly good).

DIAGNOSTIC CHARACTERS.—Pileus umbilicate to infundibuliform, smooth to pitted in centre, finely radially striate further outwards, concentrical zones numerous, crowded, often corrugating the surface, original tomentum collapsing to fibrillose surface. Stipe usually slender, with bulbous base. Context thin, hardly duplex in pileus, much more so in base of stipe, soft-corky throughout.

HABITAT.—Much the same as in variety *scrobiculatum*, also under *Pinus*.

DISTRIBUTION.—As in variety *scrobiculatum*, although less common, and rarely typical.

ILLUSTRATIVE COLLECTION.—Noord-Brabant: Veldersbos between Boxtel and Best, 13 X 1946, *Maas G. 3422* (L).

EXSICCATI.—Desmazières, Pl. crypt. France, ser. 2: 271 (*Hydnum*; K); Fuckel, Enum. Fung. Nassov., ser. 1: 948 (*Hydnum*; L); Fuckel, Fungi rhen. 1348 (*Hydnum*; K); Jack, Leiner & Stizenberger, Kryptog. Badens 654 (*Hydnum*; K); Karsten, Fungi fenn. exs. 430 (*Hydnum ferrugineum*; K); Klotzsch, Herb. viv. mycol. 124 (*Hydnum cyathiforme*; L not homogeneous, one packet containing var. *scrobiculatum*, the other var. *zonatum*); Kryptog. exs. vindob. 2017 (*Hydnum scrobiculatum*; K); Mougeot & Nestler, Stirp. cryptog. 296 (*Hydnum concrescens*; K); Rabenhorst, Herb. mycol., ed. 2: 8 (*Hydnum tomentosum*; L partly var. *zonatum*, partly indeterminable); Saccardo, Mycoth. ven. 826 (*Hydnum*; K); Westendorp, Herb. crypt. belg. 1392 (*Hydnum*; K).

Hydnum velutinum Fr. has long been a source of error. Not until Lundell's note (1954: 4) was it realised that the species as understood by Quélet (1888), Banker (1906), Bourdot & Galzin (1928), Konrad & Maublanc (1929), Bresadola (1932), and Donk (1933) actually refers to *Hydnum spongiosipes* Peck. The last mentioned author already pointed out that the Swedish specimens might not be identical with that species, and rather more closely allied to *H. ferrugineum*. Lundell dismissed the true *H. velutinum* of Fries as being only "a form of *H. ferrugineum* with an unusually marked velutinous cover . . ." A collection of "*Hydnellum velutinum*" in Herb. Donk (Sweden, Uppland: Årbyskog near Storvreta, in coniferous woods, 16 IX 1932. leg. det. *Donk*, No. *3547*), approved by Lundell, seems to give a clue to that view. Two of the specimens very much resemble *H. ferrugineum* in that the pileus is plane and uniformly covered with a soft plush-like tomentum, but it should be

noticed that they clearly represent a young stage. Other, and obviously older, specimens, with the pileus more depressed in the centre, have the margin radially striate or even somewhat ridged. This feature is more pronounced in both of the Dutch collections mentioned under variety *velutinum* which, in addition, show the margin faintly concentrically zonate. Both characters are also shown to advantage in a collection from France (locality not specified, no date, leg. *V. Dupain*, in Herb. Romell, S) which Lundell had identified as *Hydnum ferrugineum* f. *velutinum*. Since (1) the Dutch, French and Swedish collections form a coherent group, (2) of the Dutch material especially the collection from Denekamp admirably matches Fries's description of *H. velutinum*, whereas the identity of the French and Swedish material is backed by Lundell's approval, and (3) the quality of the margin of the pileus being radially striate and concentrically zonate in my opinion is a feature characteristic also of var. *scrobiculatum* and var. *zonatum*, I have come to the conclusion that *H. velutinum* Fr. rather than being related to *Hydnellum ferrugineum*, forms part of a species on its own.

Very characteristically Fries described his *Hydnum velutinum* with the words "pileo subcoriaceo infundibuliformi..." Although these exclude the possibility of *H. velutinum* being identical with *H. spongiosipes* which at maturity is compact, "juicy", and turbinate, the difference between both, as will be shown in the following, is too small to justify the maintenance of the latter as a separate species.

Hydnum spongiosipes Peck is very near variety *velutinum*. Typical examples of both may be distinguished as follows.

Var. *velutinum*	Var. *spongiosipes*
Pileus plane to depressed, with a tendency to become umbilicate.	Pileus convex to turbinate, becoming depressed.
Dull yellow-brown to fulvous at maturity.	Cinnamon brown at maturity.
Harder part of context in centre of pileus abruptly separated from softer spongy tissue	Harder part of context gradually merging into softer part.
Spongy tissue azonate or obscurely zonate.	Spongy tissue zonate.
Spongy tissue loosely woven.	Spongy tissue fairly compact.
Surface frequently becoming matted.	Surface long remaining plushy.
Surface remaining dry when handled.	Surface collapsing and exuding red juice when handled.

For some of the morphological differences there is an anatomical basis as is shown in the following table.

Var. *velutinum*	Var. *spongiosipes*
Spongiose tissue towards surface made up of criss-cross interwoven hyphae.	Spongiose tissue towards surface made up of predominantly parallel hyphae.
Interstices fairly large, polygonous.	Interstices smaller, fusiform.
Hyphae frequently conglutinate, collapsed.	Hyphae more free, not collapsed.

Although the characteristics mentioned seem clear-cut, they actually intergrade, whereas examples of one variety may be found to possess one or more features of the other variety. This renders it impossible for me to regard

Hydnum spongiosipes Peck as specifically distinct from *Hydnum velutinum* Fr.

As far as their distribution in Europe is concerned, variety *spongiosipes* differs from variety *velutinum* in that the former is absent in northern latitudes (Lundell, 1954: 4). Variety *velutinum*, on the other hand, extends, as already stated above, as far south as France, and probably even farther. The words "demum interdum subinfundibuliformis" which Bresadola used in describing the pileus of his *Hydnum velutinum* (= var. *spongiosipes*) seem to suggest that var. *velutinum* also occurs in Italy, and that Bresadola mistook specimens of this variety for var. *spongiosipes*. Likewise, I am not quite sure of the description Coker & Beers gave of the American "*Hydnellum velutinum*". True var. *velutinum* does occur in the United States as is apparent from a collection in Herb. Donk ("*Hydnellum scrobiculatum*", N.Y., Schagticoke, 7 VIII 1905, *Banker 1070*). Since, moreover, such collections of "*Hydnellum velutinum*" from Herb. Coker (NCU) as Nos. *12139* and *12759* show features (yellow-brown colour, matted surface) which I consider typical of variety *velutinum*, I prefer to leave out for the present Coker & Beers's description as being probably not quite characteristic of variety *spongiosipes*.

If in the foregoing the relation between var. *spongiosipes* and var. *velutinum* has been discussed at some length, it is only to show that to my mind the position of either is not at all clear yet.

Roumeguère [*in* Rev. mycol. 4 (No. 16): 263. 1882] described a *Hydnum cinereum* f. *ferrugineum* which was based on material received from near Lyon and the neighbourhood of Brussels. Very little can be made of this description, but from the material of the Belgian collection which Roumeguère distributed under No. 2307 in his exsiccati series, it may be assumed that *Hydnellum velutinum* var. *spongiosipes* was meant.

Before discussing the relation between *H. scrobiculatum* and *H. zonatum*, it should be pointed out that, with the exception of a single case, Persoon's *Hydnum concrescens* has generally, and incorrectly, been mistaken for a synonym of *H. zonatum*. In Persoon's herbarium there are three sheets labelled "*Hydnum concrescens*, *Hydnum cyathiforme* Bull.", each with a number of fruit-bodies glued to it. For consideration of typification, one of the sheets may be ruled out since the annotation "Prope Parisios" indicates that Persoon could not have used this material for the description of *H. concrescens* in either his "Observationes" or "Synopsis". The material on the second sheet is heterogeneous in that it is partly what now would be called *Hydnellum velutinum* var. *scrobiculatum*, partly var. *zonatum*. The material of the last sheet, consisting of two solitary specimens, is more homogeneous, agreeing in nearly every detail with the description in the "Observationes". In the absence of evidence to the contrary, I regard this material as the type, the most salient feature of which is the lack of dense zonation of the surface of the cap so apparent in true *H. zonatum*. There is no allusion to such zonation in the description either, although one of the specimens is marked by a few indistinct zones. The material differs from the description in that the specimens are not "confluens". This would suggest that Persoon for the description of his species also borrowed from Bulliard's plate 156 to which he referred. On the other hand, one of the specimens undeniably resembles

Batsch's figure 221, which may have been the reason for Persoon to change his mind later on, leaving out the reference to Bulliard's plate in his "Synopsis". It is probably the concrescence of the pilei more than anything else that induced Persoon, in his "Mycologia europaea", to include in his synonymy also *Hydnum zonatum*, and even *Hydnum cyathiforme* Schaeff. (= *Phellodon tomentosus*).

The original description of *H. scrobiculatum* by Fries supplements that of *H. concrescens* by Persoon ("Pileus ... vertice tuberculato-scrobiculatus squamoso-fibrosus ..."), at the same time showing only a few discrepancies with the variety as now understood. Of these I fail to account for the stipe being described as "radice elongata radicatus," unless by it the basal portion is meant which grows out to some length when among deep moss, the usual habitat in Sweden. With us the stipe is not found with an elongated root. Presumably, the description of the pileus as "semper azonus" should be seen as opposed to the dense zonation in *H. zonatum*, whereas the "substantia interna" must have appeared "azona" to Fries as compared with the flesh in e.g. *H. pullum* Sw. ex Fr. (= *Hydnellum suaveolens*). From the above, in conjunction with the fact that both Persoon and Fries referred to Bulliard's plate 156, I conclude that *H. concrescens* and *H. scrobiculatum* are identical.

In his "Systema" (1821: 405) Fries described a *Hydnum connatum* C. F. Schultz ex Fr. If it could be proved to be identical with var. *scrobiculatum*, the epithet "*connatum*" would take precedence over "*scrobiculatum*".

Fries vacillated as to the mutual relation of *H. scrobiculatum* and *H. zonatum* (1815, 1821), but finally enumerated both as separate species, holding forth that they hardly ever occurred in the same region (1838, 1874).

The only author to treat *H. concrescens* and *H. zonatum* as separate species is Banker (1906: 157), but the connection of the former with *H. scrobiculatum* was not at all clear to him. In a later work (1913: 199) he returned "to the prevailing view of the European mycologists," regarding *H. concrescens* as synonymous with *H. zonatum*, whereas in the meantime his conception of *H. scrobiculatum* had developed into a mixture of this species and *H. ferrugineum*.

Bourdot & Galzin cautiously observed that ordinarily *Calodon scrobiculatum* and *C. zonatum* may be rather easily distinguished.

Konrad & Maublanc were more affirmative in giving a number of characteristics by which it should be possible to distinguish one species from the other.

Donk frankly admitted his own determinations to be uncertain, those marked with an asterisk even more so than those without.

Miller (1935: 372) wrote: "It seems equally plausible that *C. scrobiculatum* and *C. zonatum* represent one species. Many specimens under both names were studied at the New York Botanical Garden. They clearly merge and are practically indistinguishable," which opinion was verbatim repeated by Miller & Boyle (1943: 68).

Coker & Beers followed Banker in accepting two species, viz. *H. scrobiculatum* and *H. zonatum*. However, the former is, in agreement with Banker's view, a mixture of *Hydnellum ferrugineum* and *H. velutinum* var. *scrobiculatum*, whereas according to their description and plate 50 at least part of

their material of *H. zonatum* f. *vespertilio* seems to be intermediate between *H. velutinum* var. *scrobiculatum* and var. *zonatum*.

Finally, Lundell (1954: 5) wrote of *H. zonatum*: "...which I consider to be only a larger, darker and more distinctly zonate variety of *H. scrobiculatum*, growing under oak."

In my opinion, typical *Hydnum scrobiculatum* may be easily distinguished from equally typical *Hydnum zonatum*, but the perfectly continuous line of intermediate specimens renders a specific segregation impossible. The first author to regard both taxa as varieties of one species is Fries who in his "Systema" combined them under the name *Hydnum cyathiforme*. This name cannot, however, be used as basionym for a recombination under *Hydnellum*, since it would result in a later homonym of *Hydnellum cyathiforme* (Schaeff. ex St.-Amans) P. Karst. (1879: 41), which is *Phellodon tomentosus*.

In connection with *Hydnum zonatum* Batsch is commonly cited as the pre-Friesian author. However, Batsch described *H. zonatum* twice, first in his "Elenchus" (1783: 111), secondly in the "Continuatio secunda" of the same work (1789: 109), unaware of the fact that both descriptions refer to two totally different species. The former is based on Schaeffer's plates 139 and 272 both of which represent a *Phellodon*. Of these I select plate 139 (= *Phellodon tomentosus*) as the type. The latter description, accompanied by pl. 40, fig. 224, clearly refers to a *Hydnellum*. It is this figure that Fries cited when describing *his Hydnum zonatum*, with the exclusion of Schaeffer's plates quoted by Batsch. By this procedure Fries excluded the type of *H. zonatum* Batsch, and it follows that *H. zonatum* Fr. is a different species, the type of which is represented by Batsch's figure 224.

Hydnum queletii has commonly been regarded as a variety of *H. zonatum*, or at least as being more related to this species than to *H. scrobiculatum*. The origin of this view are, no doubt, Fries's words "Forte varietas prioris ..." (1874: 605). However, comparison of the type of *H. queletii*, received on loan from Uppsala through the courtesy of the Director, with that of *Hydnum concrescens* Pers. – which, as pointed out above, is identical with *H. scrobiculatum* – , shows them alike save for the fact that the specimen from Uppsala has a shorter stipe and the pileus more sharply rugose. Since both characters are variable, no great value can be attributed to them. An extreme development of the rugosity of the cap is seen in the material of *Calodon zonatum* var. *queletii* that Bourdot received from L. Maire under No. *2544* (PC). Here the pileus is covered by a profusion of lamellate ridges, running from centre to margin, and lacerated at their edges.

Banker (1913: 200) described a *Hydnellum parvum* which he regarded as distinct from *Hydnellum zonatum*, and believed to be non-European. I have not seen the type specimens, but from both the original description and that given by Coker & Beers, I am inclined to consider *H. parvum* to be fully identical with the present var. *zonatum*.

With regard to *Hydnum vespertilio* the following may be observed. Banker admitted *H. vespertilio* to be "very near *H. hybridum* and *H. zonatum*," but

considered "the rows of scabrous, yellow dots that mark the zonations of the pileus" one of its most distinctive features. To this Coker & Beers added some more characteristics, some of which, however, do not agree with my own notes on a specimen of the type material. As can be gathered from Banker's statement, this material consists of several specimens, one of which was sent to me through the courtesy of the Director of the Kew Herbarium.

The specimen looks as if cut in half which suggests the plant to have originally been infundibuliform. The very dark colour may be due to slow drying, whereas Banker's explanation of the specimens being old and weathered when collected also sounds plausible. Pileus thinly felted with yellowish brown tomentum, which is best observed in centre and near margin, otherwise glabrous, marked with a few slightly raised concentrical zones, and dotted with numerous yellowish excretions, finely radially fibrillose. Stipe short, but presumably cut or broken, tapering downwards, thinly brown-felted. Spines dark brown, somewhat agglutinated, covered with hyphae and diaspores of some mould. Mature spores not observed, but immature ones still attached to the sterigmata were seen to be coarsely verrucose, and irregular in outline.

Contrary to the statament of Coker & Beers for their material, the specimen from Kew is not larger than any good-sized *Hydnellum velutinum* var. *zonatum*, whereas the surface has no "dinstinct radial ridges." From what I have seen of Berkeley's type, I am satisfied that *Hydnum vespertilio* is in no way different from *Hydnellum velutinum* var. *zonatum*.

References

BANKER, H. J. 1906. A Contribution to a Revision of the North American Hydnaceae. *In* Mem. Torrey bot. Cl. **12**: 99–194.

——— 1913. Type studies in the Hydnaceae—V. The genus *Hydnellum*. *In* Mycologia **5**: 194–205.

DONK, M. A. 1956. The generic names proposed for Hymenomycetes—V. "Hydnaceae". *In* Taxon **5**: 69–80, 95–115.

LUNDELL, S. 1954. *Hydnum ferrugineum* Fr. *In* Lundell & Nannfeldt, Fungi exsiccati suecici, praesertim upsalienses. Fasc. 45–46: 4.

——— 1954. *Hydnum scrobiculatum* Fr. *In* Lundell & Nannfeldt, Fungi exsiccati suecici, praesertim upsalienses. Fasc. 45–46: 5.

MAAS GEESTERANUS, R. A. 1956. The stipitate Hydnums of the Netherlands—I. *Sarcodon* P. Karst. *In* Fungus **26**: 44–60.

MILLER, L. W. 1935. The Hydnaceae of Iowa IV. The genera *Steccherinum*, *Auriscalpium*, *Hericium*, *Dentinum* and *Calodon*. *In* Mycologia **27**: 357–373.

MILLER, L. W. & BOYLE, J. S. 1943. The Hydnaceae of Iowa. *In* Univ. Iowa Stud. Nat. Hist. **18** (2).

NIKOLAJEVA, T. L. 1954. K flore ezhovikovikh gribov (sem. Hydnaceae) SSSR. Rody *Hydnellum* Karst. i *Phellodon* Karst. *In* Pl. cryptog. **9**: 465–494.

POUZAR, ZD. 1956. Příspěvek k poznání našich kloboukatých lošáků. *In* Česka Mykol. **10**: 65–76.

SNELL, W. H., DICK, E. A., JACKSON, H. A. C. & TAUSSIG, M. 1956. Notes on the pileate Hydnums. III. *In* Lloydia **19**: 163–175.

INDEX

Caldesiella ferruginosa (Fr.) Sacc. . . . 60

Calodon aurantiacus (Batsch ex Fr.) P. Karst. 52
– *caeruleus* (Hornem. ex Pers.) P. Karst. . 54
– *compactus* sensu P. Karst. 55
– *cyaneotinctum* (Peck) Snell 54
– *diabolus* (Banker) Snell 58
– *ferrugineus* (Fr. ex Fr.) P. Karst. . . 60
– *floriforme* sensu Quél. 60
– *scrobiculatus* (Fr. ex Secr.) P. Karst. . 61
– *velutinum* sensu Quél. 62
– *velutinus* (Fr.) P. Karst. 61
– *zonatum* var. *queletii* (Fr. apud Quél.) Quél. 62
– – var. *scrobiculatum* (Fr. ex Secr.) Quél. 61
– *zonatus* (Fr.) P. Karst. 61

Hydnellum P. Karst. 50
– subgen. Anomohydnellum Pouz. . . . 51
– subgen. Hydnellum 51
– subgen. Phaeohydnellum Pouz. . . . 51
– – sect. Aurantiaca Pouz. 51
– – sect. Velutina Pouz. 51
– *acre* (Quél.) Donk 56
– alachuanum (Murr.) Coker & Beers . 51
– aurantiacum (Batsch ex Fr.) P. Karst. 52
– caeruleum (Hornem. ex Pers.) P. Karst. 54
– *carbunculus* sensu Banker 58
– carolinianum Coker 51
– compactum (Pers. ex Fr.) P. Karst. . . 56
– *compactum* sensu Nikol. 55
– complicatum Banker 51
– *concrescens* (Pers. ex Pers.) Banker . . 61
– *cyaneotinctum* (Peck) Banker 54
– *cyathiforme* (Schaeff. ex St.-Amans) P. Karst. 61
– diabolus Banker 58
– earlianum Banker 51, 54
– ferrugineum (Fr. ex Fr.) P. Karst. . . 60
– ferrugipes Coker 51, 54
– *floriforme* (Schaeff. ex Secr.) Banker . . 52
– geogenium (Fr.) Banker 51
– *hybridum* (Bull. ex Mérat) Banker . . . 60
– inquinatum Banker 56
– mirabile (Fr.) P. Karst. 57
– *parvum* Banker 69
– *queletii* (Fr. apud Quél.) P. Karst. . . 62
– rhizopes Coker 51
– *sanguinarium* Banker 60
– *sanguinarium* sensu Coker 62
– *scrobiculatum* (Fr. ex Secr.) P. Karst. . 61
– suaveolens (Scop. ex Fr.) P. Karst. . . 51
– velutinum (Fr.) P. Karst. 61
– *velutinum* sensu Banker 62
– – var. scrobiculatum (Fr. ex Secr.) Maas G. 63
Hydnellum velutinum var. spongiosipes (Peck) Maas G. 62
– – var. velutinum 62
– – var. zonatum (Fr.) Maas G. . . . 64
– *vespertilio* (Berk.) Banker 61
– *zonatum* (Fr.) P. Karst. 61
– – f. *vespertilio* (Berk.) Coker & Beers . 61

Hydnum acre Quél. 56
– *aurantiacum* Alb. & Schw. ex Fr. . . . 52
– *caeruleum* Hornem. ex Pers. 54
– *carbunculus* Secr. 58–60
– *cinereum* f. *ferrugineum* Roumeg. . . . 67
– *compactum* Pers. ex Fr. 56
– – sensu Fr. 55
– – sensu Inzenga 56
– – var. β ? *striatum* sensu Pers. 60
– *concrescens* Pers. ex Pers. . . . 61, 63
– *connatum* C. F. Schultz ex Fr. 68
– *cyaneotinctum* Peck 54
– *cyathiforme* Schaeff. ex St.-Amans . . 61
– – a. Fr. 61, 63
– – b. Fr. 61
– *diabolus* (Banker) A. H. Smith 58
– *ferrugineum* Fr. ex Fr. 60
– – Pers. 60
– – f. *velutinum* 66
– *floriforme* Schaeff. ex Secr. 52
– – sensu Secr. 55
– – var. *ferrugineum* (Fr. ex Fr.) Cost. & Dufour 60
– *hybridum* Bull. ex Mérat 60
– *pulvinatum* Secr. 57
queletii Fr. apud Quél. 61, 63
– *scrobiculatum* Fr. ex Secr. 61, 63
– *spongiosipes* Peck 62
– *stohlii* Rabenh. 52
– *striatum* Schaeff. 60
– *suaveolens* Scop. ex Fr. 50
– – β *H. caeruleum* Hornem. ex Fr. . . . 54
– *suberosum* var. α *spongiosa* Batsch . 61, 63
– – var. β *aurantiaca* Batsch 52
– *velutinum* Fr. 61, 62
– *vespertilio* Berk. 61, 64
– *zonatum* Batsch 61
– – Fr. 61, 64
– – var. *queletii* (Fr. apud Quél.) Cost. & Dufour 62

Phaeodon aurantiacus (Batsch ex Fr.) J. Schroet. 52
– *compactus* sensu J. Schroet. 55
– *ferrugineus* (Fr. ex Fr.) J. Schroet. . . . 60
– *zonatus* (Fr.) J. Schroet. 61

Phellodon tomentosus 61

Polyporus biennis 56

Sarcodon acre (Quél.) Quél. 56

EINE NEUE GATTUNG DER LABOULBENIALES

A. Middelhoek
Enschede

(Mit 6 Figuren)

1. Eine neue Gattung der Laboulbeniales, vertreten durch eine neue Art, wird aufgestellt und mit der nächststehenden Gattung *Laboulbenia* verglichen.
2. Eine merkwürdige Wiederholung einzelner Zellpartien wird besprochen.

Von dem holländischen Koleopterologen C. J. Louwerens empfing ich vor einigen Jahren mit Laboulbenialen besetzte Käfer, welche in Indonesien gesammelt worden waren. Dabei war ein nach Louwerens sehr seltener Käfer, *Euschizomerus aeneus* Chaud., der ihm noch nie zu Gesicht gekommen war, von A. M. R. Wegner in Balikpapan, O. Borneo, gesammelt. Der Käfer war besetzt mit vielen Exemplaren einer mir unbekannten Gattung, doch auf den ersten Blick nahe verwandt mit der Gattung *Laboulbenia*. Ich studierte die von mir präparierten 30 alten und jungen Individuen sorgfältig, doch war ich unschlüssig ob ich sie als Representanten einer neuen Gattung betrachten, oder einer bekannten Gattung einverleiben sollte. Man zögert die heute bereits ungeheure Zahl der Gattungen zu vermehren, ohne dazu aus guten Gründen gezwungen zu sein.

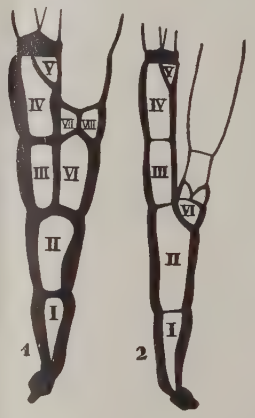


Fig. 1. Zellenfolge bei *Laboulbenia*.

Fig. 2. Zellenfolge bei *Schizolaboulbenia*.

Bei den mir vorliegenden Individuen war der interessante Fall zu beobachten, dass die Stielzelle (VI) des Rezeptakulums nicht, wie sonst bei *Laboulbenia* üblich, mit den Zellen III und IV verwachsen, sondern völlig frei geblieben war (Fig. 1 und 2). So wurde der etwas verwirrende Eindruck hervorgerufen von einer *Laboulbenia*-Art mit zerspaltenem Rezeptakulum. Eine Kenntnis des Baues des Rezeptakulums setze ich voraus, nur citiere ich, die Gattung *Laboulbenia* betreffend, aus Thaxter (1908) folgendes: „...of the remaining cells, cell VI corresponds to the normal perithecial stalk-cell of many other genera, which in this instance is never free".

Aus der Entstehungsweise des Rezeptakulums der Gattung *Laboulbenia* geht nun hervor, dass die Zellen III, IV und VI als später miteinander verwachsende Zellen zu betrachten sind. Bei Betrachtung der mir vorliegenden Pilze kam es mir in den Sinn, dass eine Einverleibung in die Gattung *Laboulbenia* doch verfehlt wäre, weil Thaxter in seiner Diagnose besonderen Wert darauf legte, dass die Zellen III, IV und VI niemals getrennt sind. Ich meinte auch vielmehr den interessanten Fall zu beobachten, dass hier eine Vorstufe in der Entwicklung nach *Laboulbenia* hin vorläge. Es schien mir, als ob Gynostichum und Androstichum getrennt geblieben und separiert auf Zelle II des primären Rezeptakulums aufgepflanzt seien. Auch schien mir eine Abgrenzung gegen die Gattung *Laboulbenia* mit ihrer ungeheueren Artenzahl schon aus rein deskriptiven Gründen wünschenswert.

Bei den Individuen, die ich studieren konnte, befanden sich einige, welche Abweichungen in der Zellenfolge aufwiesen, wie ich sie bei anderen Arten beschrieben habe (Middelhoek, 1949 und 1951). Ich meine auf diese Abweichungen zuerst aufmerksam gemacht zu haben, doch sollen sie nicht selten vorkommen. Es handelt sich hierbei um das Verdoppeln bestimmter Zellpartien, wobei es z.B. bei *Laboulbenia* zu mehreren übereinander gelagerten Perithecien, sowohl von mehreren Gruppen von sterilen als auch von fertilen Paraphysen kommen kann. Für die Gattung bedeutet dies, phylogenetisch betrachtet, vielleicht einen früheren Zustand, wobei eine Konstante Zahl der Rezeptakulumzellen noch nicht erreicht war. Bei den studierten Individuen gab es einige, bei denen die Zellen III, IV und V zweimal übereinander gelagert vorkamen (Fig. 5), ohne jedoch eine weitere Entwicklung sehen zu lassen, das heisst Paraphysen auszubilden (vergleiche Middelhoek, 1951).

In der unten folgenden Gattungs- und Artbeschreibung stütze ich mich auf die von Spegazzini (1916) vorgeschlagene Terminologie.

Fam. LABOULBENIACEAE

Schizolaboulbenia Middelhoek, *gen. nov.*

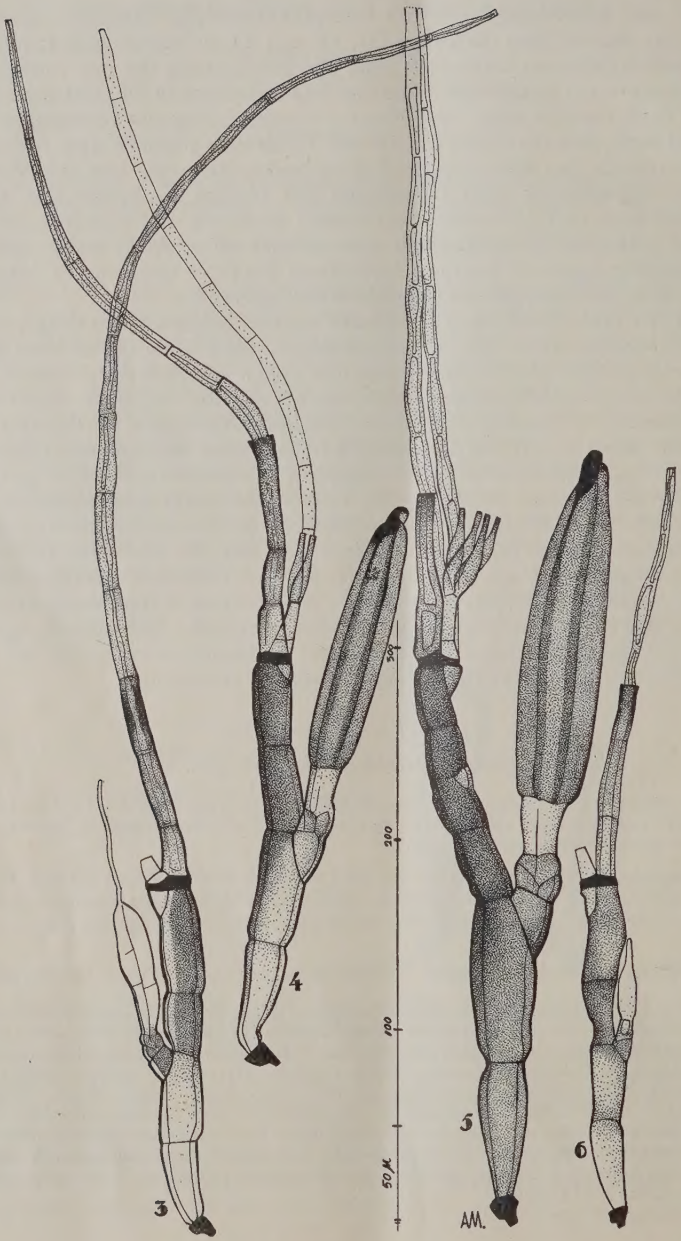
Receptaculum compositum ut in genere *Laboulbenia* Robin, sed cellulae III et IV haud cum cellula VI conjunctae, sed cellulae II receptaculi primarii liberaliter impositae, itaque androstichum gynostichumque separata sunt.

Rezeptakulum zusammengesetzt wie bei *Laboulbenia* Robin, Zellen III und IV aber nicht mit Zelle VI verbunden, sondern völlig frei der Zelle II des primären Rezeptakulums aufgesetzt, weshalb Androstichum und Gynostichum geschieden sind.

Schizolaboulbenia banhegyii Middelhoek, *spec. nov.*—Fig. 4 (holotypus)

Receptaculum primarium obconicum, elongatum, ungue normali. Gynostichum in axi receptaculi primarii; cellula VI sat parva, oblique cellulae II imposita. Perithecium fere symmetricum, fusiforme, elongatum, labia dorsali bene evoluta, supra hypocarpum attenuatum et fere decoloratum. Androstichum dorsaliter distans; cellulae III et IV elongatae, melanopsallio terminatae. Paraphysopodium paraphyso primario longo, singulo, saepius fracto instructum. Andropodium antheridiophoris singulis vel compluribus, in parte inferiore antheridias lageniformes gerentibus obsitum. Fungus totus colore mellis vel electri, parte basali perithecii fere decolorata excepta. Receptaculum totum in dorso et superne intensius coloratum. Paraphysum primarium brunneum, distaliter pallidius, antheridiophoris clarioribus. Perithecium zona hypostomali atra bene evoluta.

In *Euschizomero aeneo* Chaud.


3
4
5
6
AM.
50 µ
100
200
300

Primäres Rezeptakulum in die Länge gezogen, umgekehrt kegelförmig; unguis normal. Gynostichum in der Achse des primären Rezeptakulums; Zelle VI ziemlich klein und mit schiefer Trennungswand der Zelle II aufgepflanzt. Perithecium ungefähr symmetrisch, in die Länge gezogen, mit gut entwickelter Dorsallippe, oberhalb des Hypocarps eingeschnürt und farblos. Androstichum dorsal abstehend; Zellen III und IV in die Länge gezogen und durch ein Melanopsallium begrenzt. Das Paraphysopodium trägt ein langes einzelnes primäres Paraphysum, welches öfters abgebrochen ist. Das Andropodium trägt ein oder mehrere Antheridiophoren, welche an der Basis flaschenförmige Antheridien tragen. Der ganze Pilz honig bis bernsteinfarbig, mit Ausnahme des mehr oder weniger farblosen Basalteils des Peritheciums. Das ganze Rezeptakulum dorsal und nach oben zunehmend dunkler gefärbt. Primäres Paraphysum mittelbraun, distal heller werdend, die Antheridiophoren heller als das primäre Paraphysum. Perithecium mit gut entwickelter schwarzer hypostomaler Zone.

Auf *Euschizomerus aeneus* Chaud. (det. C. J. Louwerens), 30 adulte und juvenile Exemplaren, auf rechtem Vorderbein und rechter Elytra; Balikpapan, O. Borneo, 1952, leg. A. M. R. Wegner.

Es ist mir eine Freude und Ehre diese neue Art dem hervorragenden ungarischen Laboulbenienkenner Prof. Dr Joseph Bánhegyi widmen zu dürfen.

LITERATUR

MIDDELHOEK, A. 1949. Laboulbeniaceae in Nederland-III. *In* Nederlands Kruidkundig Archief **56**: 254–255.

MIDDELHOEK, A. 1951. About some interesting variations in the genus *Laboulbenia*. *In* Biologisch Jaarboek Dodonaea, 122–129.

SPEGAZZINI, C. 1916. Revisión de las Laboulbeniales Argentinas. *In* Anales del Museo Nacional Hist. Natur. Buenos Aires, 552–555.

THAXTER, R. 1908. Contribution towards a monograph of the Laboulbeniaceae. *In* Mem. Acad. Arts and Sci. **2**: 325.

Fig. 3–6. *Schizolaboulbenia banhegyii* Middelhoek: 3 und 6—juvenile Individuen; 4—holotypus; 5—abweichendes Individuum.

INHOUD

M. A. Donk: *Notes on resupinate Hymenomycetes—IV* 1
J. Gremmen: *Taxonomical notes on Mollisiaceous Fungi—V. On some species described by Velenovský* 30
———: *Microfungi decomposing organic remains of Pines* 34
H. S. C. Huijsman: *Sur quatre Strophariaceae* 43
R. A. Maas Geesteranus: *The stipitate Hydnums of the Netherlands—II. Hydnellum P. Karst.* 50
A. Middelhoek: *Eine neue Gattung der Laboulbeniales* 72

NEDERLANDSE MYCOLOGISCHE VERENIGING

G. L. van Eyndhoven, *voorzitter*, Floraplein 9, Haarlem.

Dr G. A. de Vries, *onder-voorzitter*, Beukenlaan 8, Baarn.

Mej. Dr A. Jaarsveld, *secretaresse*, Hugo de Vries-laboratorium, Plantage Middenlaan 2a, Amsterdam-C.

Mej. J. P. S. Smit, *penningmeesteresse*, Nic. Maesstraat 135, Amsterdam-Z.
Giro Nederl. Mycol. Ver., Amsterdam, No 90902.

Dr M. A. Donk, Prins Mauritslaan 18, 's-Gravenhage.

Dr R. A. Maas Geesteranus, *bibliothecaris*, Rijksherbarium, Nonnensteeg 1, Leiden.